TECHNICAL MANUAL

MAINTENANCE INSTRUCTIONS

WITH

ILLUSTRATED PARTS BREAKDOWN

INTERMEDIATE

RADIO COMMUNICATION SYSTEM AN/GRC-206(V)1 PART NUMBER 707167-801 AND AN/GRC-206(V)2 PART NUMBER 707167-802

BASIC AND ALL CHANGES HAVE BEEN MERGED
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INTRODUCTION

This technical order is prepared in accordance with specifications MIL-M-38784A and MIL-M-38798B. It contains information and instructions with an illustrated parts breakdown required at intermediate maintenance level, for Radio Communication System AN/GRC-206(V)1 and AN/GRC-206(V)2. This information is presented in seven chapters.

Chapter 1 contains general information for operation and maintenance familiarization.

Chapter 2 provides the preparation and installation instructions.

Chapter 3 provides information essential to preparation for use and reshipment.

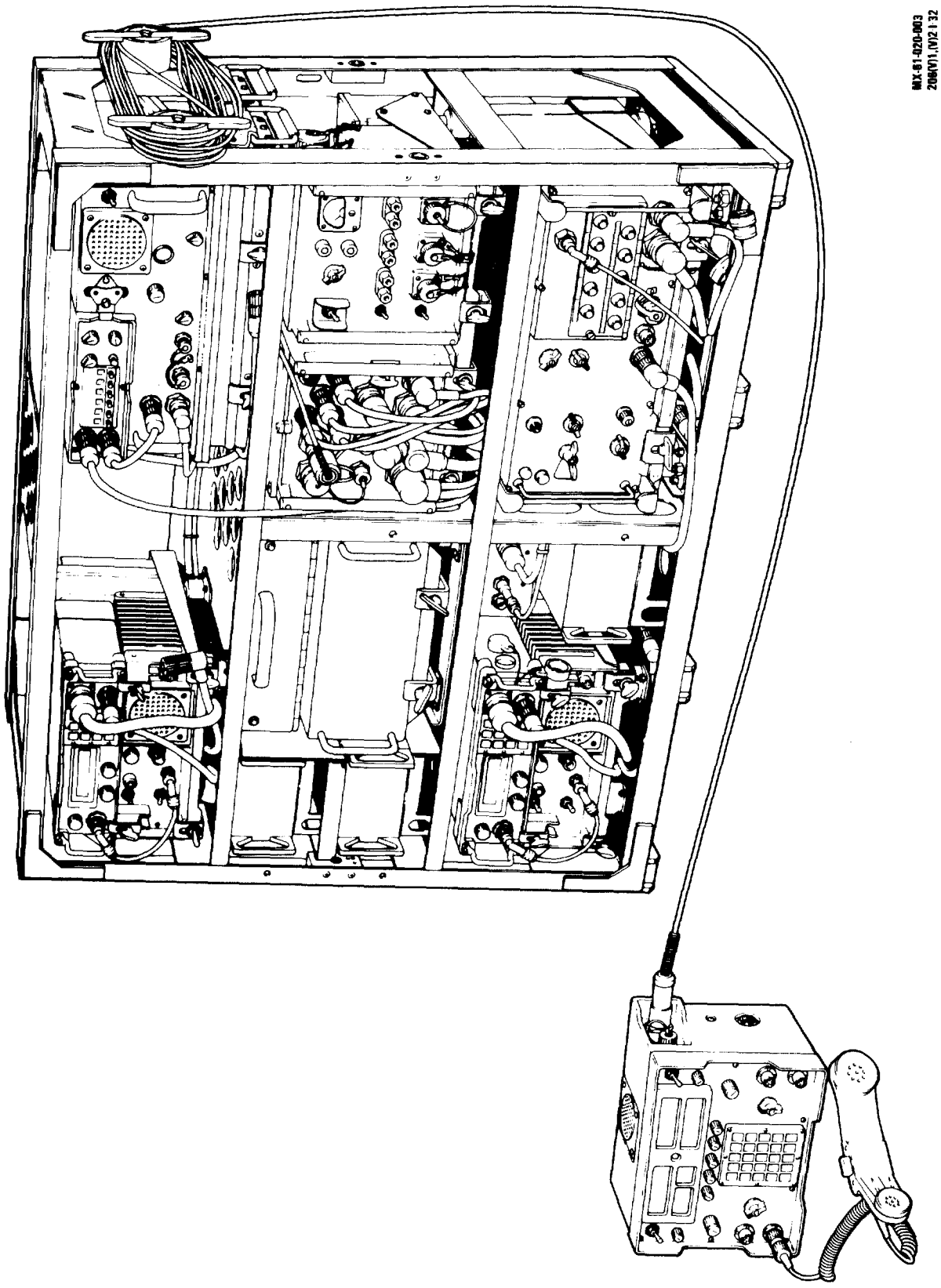
Chapter 4 contains the procedures for operation and explains the principles of operation.

Chapter 5 provides practical information concerning proper maintenance.

Chapter 6 contains the circuit diagrams.

Chapter 7 contains the Illustrated Parts Breakdown.

Illustrations, charts, and tables supplement the text throughout for a better understanding. General contents of this manual are reflected in the table of contents, list of illustrations, and list of tables. A quick-reference index is furnished to provide location of a particular item.



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206(V)1,(V)2 1-32

Figure 1-1. Radio Communication System AN/GRC-206(V)1

CHAPTER 1

GENERAL INFORMATION

1-1. GENERAL. Radio Communication System AN/GRC-206(V)1 and AN/GRC-206(V)2 (Radio System) are similar communications systems. Throughout this manual, text and illustrations apply to both Radio Systems unless specifically noted. Table 1-1 lists the definitions of terms and abbreviations used throughout this manual. Table 1-2 lists the common names of equipment used within the Radio Systems and the official nomenclature or description. Table 1-5 lists the equipment supplied with the Radio Systems and indicates if the equipment is used with only one system.

1-2. DESCRIPTION AND PURPOSE. The Radio System is a rack mounted tactical communications system. The Radio System is packaged for mounting in the M-151A1/A2 (M-151) 1/4 ton utility vehicle, or the M-113-A1/A2 (M-113) Armored Personnel Carrier (APC). When the Radio System is installed in the vehicle (M-151 or M-113), it may be operated as a stationary or mobile communication facility. Both Radio Communication Systems, AN/GRC-206(V)1 (fig. 1-1) and AN/GRC-206(V)2 (fig. 1-2), incorporate HF-SSB, VHF-FM, VHF-AM and UHF-AM subsystems, and associated electronic equipment to provide radio communication capabilities, in three communications bands. Radio Communication System AN/GRC-206(V)1, also provides all the mechanical and electrical interfaces (e.g., equipment mounts, cables, etc.) necessary to install and operate user supplied communication security (COMSEC) equipment. The Radio System is intended for use by Tactical Air Control Parties for tactical ground-to-ground and ground-to-air communications, and by other Tactical Air Control System (TACS) elements with similar requirements.

1-3. ELECTRICAL DESCRIPTION. The Radio System can be operated as a mobile or fixed tactical communication station. Primary power (+22.5 to +30.0 Vdc) for the Radio System is supplied by either of two sources: the vehicle (M-151 or M-113) electrical system during mobile operations; or an auxiliary motor generator (e.g. MEP-025) during stationary (fixed) operations. In addition, the Radio System is equipped with a power selector switch which allows the Radio System to be operated from the vehicle batteries for a short time should the main power sources become disabled. The Radio System provides the following communications capabilities: a HF-SSB subsystem, operating in the 2.0000 through 29.9999 MHz range; a VHF-FM subsystem, operating in the 30.00 through 75.95 MHz range; a VHF-AM subsystem, operating in the 116.000 through 149.975 MHz range; and a UHF-AM subsystem, operating in the 225.000 through 399.975 MHz range. Separate control and simultaneous operation of the above capabilities is possible, limited only by certain frequency combinations prone to interference, and communication security restrictions. A signal distribution unit (SDU) is used to interface the four subsystems with one or two radio set controls (RSCs). The RSC/SDU interface allows complete control of the Radio System (through the use of local and remote cables) from local or remote locations. Local emergency operation is possible by bypassing (removing system interconnect cables from any subsystem) the RSC/SDU interface, and controlling an individual subsystem by its front panel controls.

1-4. PHYSICAL DESCRIPTION. The Radio System is designed to mount in the M-151 vehicle with M-416 trailer, or M-113 vehicle. The following paragraphs describe these support vehicles (M-151, M-416 and M-113), the Radio System, and its major components.

Table 1-1. Definitions of Terms and Abbreviations

Term/abbreviation	Definition
A/D	analog-to-digital
AM	amplitude modulation
Ancillary equipment	equipment not directly employed in the operation of the Radio System
APC	armored personnel carrier
CCA	circuit card assembly
Cipher text	secure voice communication
COMSEC	communication security
COMSEC equipment	communication security equipment (e.g., TSEC/KY-65, TSEC/KY-57, etc.)
CVSD (modem)	Continuously variable slope delta modulator/demodulator
D/A	digital-to-analog
FF	flip flop
FM	frequency modulation
F/O cable	fiber optic cable
I/O	input-output
IC subsystem	intercommunication subsystem
Kbps	kilo-bits per seconds
LCD	liquid crystal display
Local (emergency)	control is via radio set front panel controls
Local (normal)	control is via RSC-SDU interface
LRU	line-replaceable-unit
LSB	lower sideband
M-113	M-113-A1/A2 Armored Personnel Carrier
M-151	M-151 1/4 ton utility vehicle
M-416	M-416 1/4 ton utility trailer
MHz	megahertz
MNL	Indicates that RT-524 is installed as the VHF-FM radio and all operating frequencies must be manually entered at the RT front panel.
NVIS antenna	near-vertical-incident-skywave antenna
PDU	Power distribution unit (also referenced as power switchboard SB-4151)
PJU	Power junction unit
Plain text	clear voice communication
PTT	push-to-talk
RF subsystem	radio set and associated components
RSC	radio set control
RSC-SDU interface	link between operator and rf subsystems
RT	receiver-transmitter
SDI	serial data input
SDO	serial data output
SDU	signal distribution unit
SSB	single sideband
TIP	tune in progress
UART	universal asynchronous receiver/transmitter
USART	universal synchronous asynchronous receiver/transmitter
USB	upper sideband
Vehicle	M-151 with M-416 trailer or M-113 APC

Table 1-2. Reference Information

Reference (index, figure)	Offical nomenclature	Common name
figure 1-1	Radio Communication System AN/GRC-206(V)1	Radio System
figure 1-2	Radio Communication System AN/GRC-206(V)2	Radio System
1, figure 1-3	Electrical Equipment Mounting Base MT-6250/GRC-206	Equipment Mounting Rack
2, figure 1-3	Radio Set AN/VRC-83(V)1	UHF-AM Radio Set
3, figure 1-3	Signal Distribution Unit Control C-11169/GRC-206	Signal Distribution Unit (SDU)
4, figure 1-3	Radio Set AN/URC-113	HF Radio Set
5, figure 1-3	Power Switchboard SB-4151/GRC-206	Power Switchboard (SB-4151); also reference as power distribution unit (PDU)
6, figure 1-3	(Not applicable; part of index 1)	Power Junction Unit (PJU)
7, figure 1-3	Radio Receiver-Transmitter RT-246/VRC (Radio System AN/GRC-206(V)1, only) or Radio Receiver-Transmitter RT-524/VRC (Radio System AN/GRC-206(V)2, only)	VHF-FM Radio (RT-246) VHF-FM Radio (RT-524)
8, figure 1-3	(Not applicable; part of index 1)	VHF BITE panel
9, figure 1-3	Radio Set AN/VRC-83(V)1	VHF-AM Radio Set
10, figure 1-3	Radio Set Control C-11166/GRC-206	Radio Set Control (RSC)

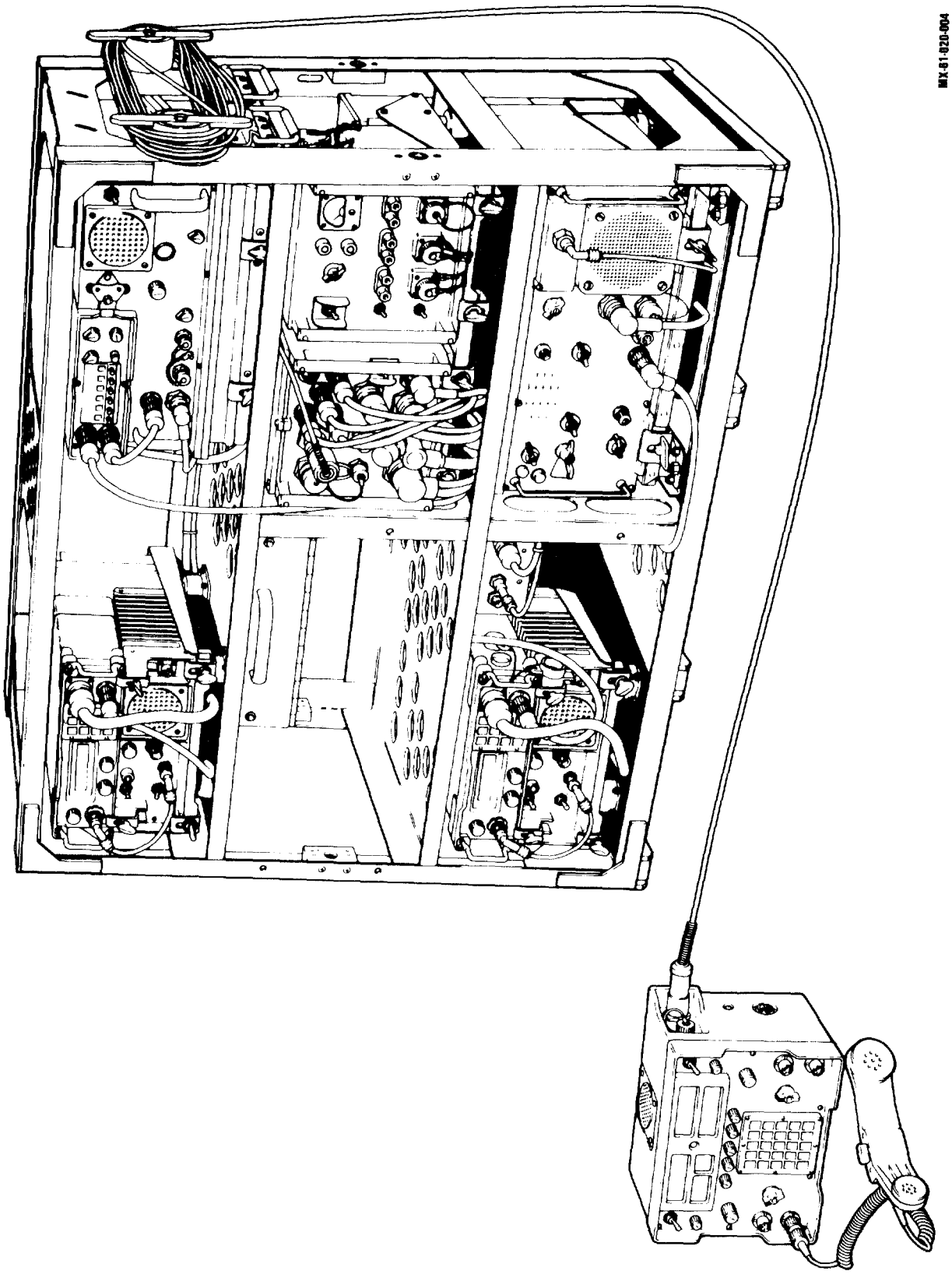

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Figure 1-2. Radio Communication System AN/GRC-206(V)2

1-5. THE M-151 VEHICLE. The M-151 is a 1/4 ton utility vehicle with a 100-ampere alternator capable of supplying primary power for the Radio System. With minor modifications, the vehicle provides space and facilities to mount the equipment mounting rack, one RSC, and three antennas. It also provides stowage space for optional antennas (and antenna segments), and cables. The M-416 trailer must be used with the M-151 vehicle to stow ancillary items supplied with the Radio System.

1-6. THE M-416 TRAILER. The M-416 is a 1/4 ton trailer used to mount and stow ancillary items when the Radio System is installed in the M-151 vehicle. The trailer mounts the auxiliary motor generator, which is used as an alternate source of primary power for the Radio System. Stowage provisions are also provided in the trailer for an accessory bag, three field packs (user supplied), an electrical equipment rack, a reel rack, two remote fiber optic cables and reel assemblies, and a reeling machine.

1-7. THE M-113 VEHICLE. The M-113 is a full tracked armored personnel carrier (APC) with a power generating system capable of supplying primary power for the Radio System. The M-113 vehicle is capable of mounting the Radio System, and antennas. It also provides stowage space for all ancillary items, including the auxiliary motor generator.

1-8. RADIO SYSTEM. The Radio System is configured within a welded aluminum mounting rack. The RF subsystems are independently mounted and interwired within the mounting rack. LRUs within the mounting rack, are mounted on mounting adapters which allows the LRUs to be removed from the mounting rack without the removal of another LRU. The RSCs for the Radio System are mounted or stowed inside the vehicle (M-151 or M-113) in accordance with the installation procedures contained in chapter two. Two installation kits are provided with each Radio System, allowing it to be mounted on alternate vehicles (the M-151 or M-113). The following paragraphs describe the major components and ancillary items of the Radio System.

1-9. EQUIPMENT MOUNTING RACK. The equipment mounting rack (1, figure 1-3) is a welded aluminum mounting structure of modular design. It provides mounting and consolidation of individual radio sets and electronic equipment into a Radio System for vehicle mounting. It also provides for stowage of ancillary items (e.g., handsets, small cables, and manuals). The equipment mounting rack supplied with Radio Communication System AN/GRC-206(V)1 also contains mounting adapters and cables for COMSEC equipment used during secure voice operations.

1-10. POWER SWITCHBOARD. Primary power for the Radio System is applied through the power switchboard. The power switchboard (5, figure 1-3), receives primary input power from two possible sources: the M-151 or M-113 vehicle electrical system, or an auxiliary motor generator (e.g. MEP-025). A power circuit breaker on the power switchboard front panel is used to interrupt input power to rack mounted equipment. A selector switch is used to select between the two primary sources (vehicle or aux mg), or vehicle override (vehicle battery). A meter is provided to monitor primary input power. A power indicator lights when input power to the rack mounted equipment is turned on. A vehicle override warning lamp is used to alert the operator when equipment operation is being supported by the vehicle battery. Three positive (+) and three negative (-) binding posts are provided to give interconnect points for miscellaneous 28 volt operated accessories. Two auxiliary connectors (J1 and J2) also provide an output of the input power. Input power available at the auxiliary outputs (binding post and connectors J1, J2) is controlled by two independent circuit breakers. Another auxiliary connector (J3) provides reserve no-break-power from the vehicle battery (J3 is not used with Radio System configurations covered in this manual).

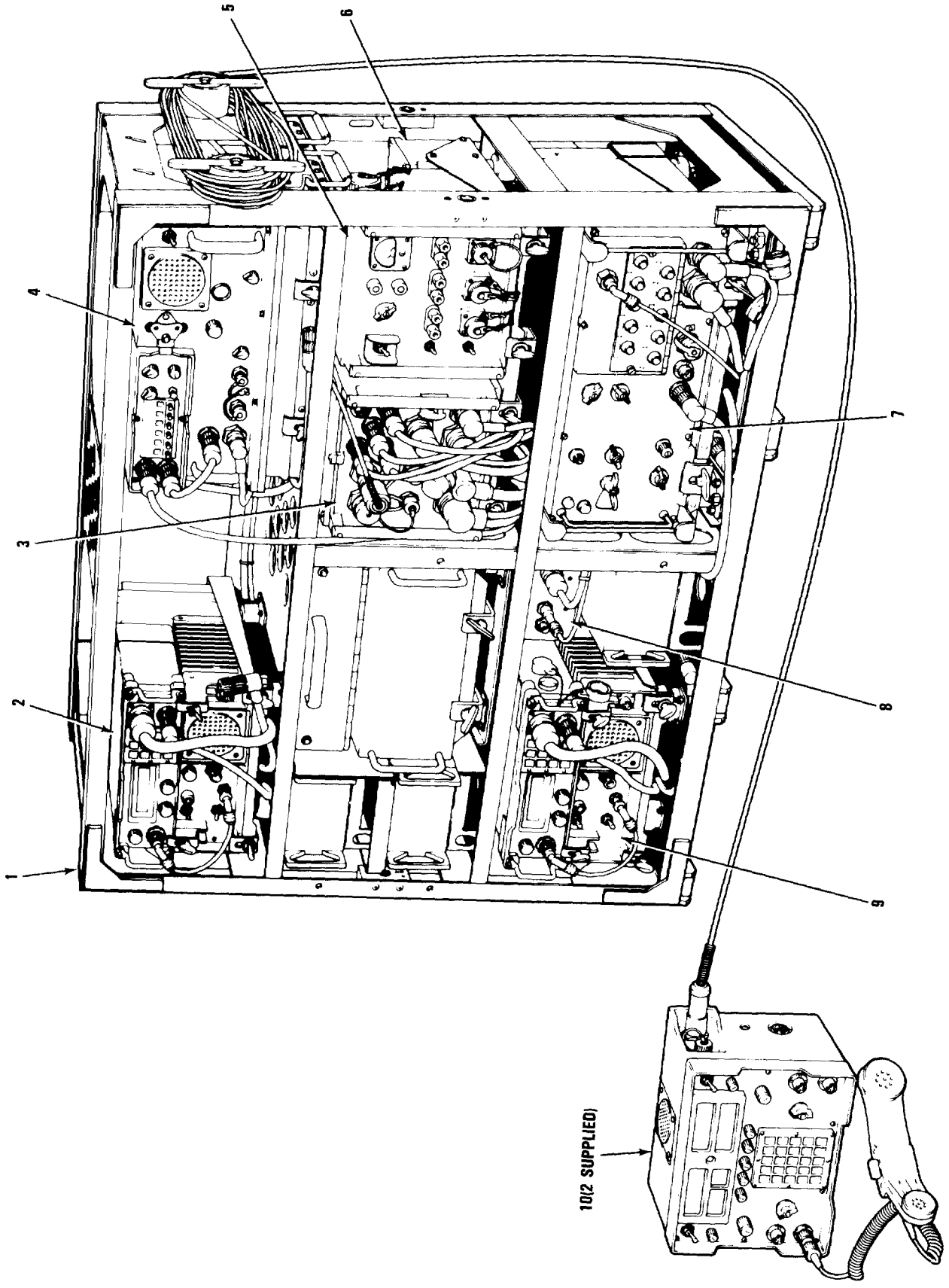


Figure 1-3. Radio System Component Locations

1-11. SIGNAL DISTRIBUTION UNIT (SDU). The SDU (3, figure 1-3) is the center of control for the Radio System. It is a microprocessor-based interface unit which processes all control, monitor, and command functions for the Radio System. The SDU provides the means to maintain communications once established by the operator. It resolves operator-to-operator and man-machine conflicts in accordance with pre-programmed instructions stored in its memory circuits. It is also the COMSEC controller for Radio Communication System AN/GRC-206(V)1, blocking all improper COMSEC operating scenarios associated with cipher text (secure voice) communications. All input-output (I/O) interfaces to the SDU are made via fourteen connectors mounted on the SDU front panel.

1-12. RADIO SET CONTROL (RSC). The RSC (10, figure 1-3) provides the capability to control and monitor the operation of the Radio System. It is the input-output terminal for the SDU, and is functionally linked to the SDU via a fiber optic (F/O) cable. Two RSC's are supplied with each Radio System. Each RSC can be operated by one or two operators. Remote F/O cabling is provided with the Radio System to deploy one RSC up to a distance of 2 km (6,562 ft). The RSC can be remotely deployed to a distance of 3 km (9,843 ft) by connecting an additional 1 km (3,281 ft) of F/O cable (user supplied). The RSC front panel provides all the displays, controls, switches, and connectors necessary to allow operator interface and control of each RF subsystem. Power to the RSC is supplied by either of two sources: internal batteries during remote operation, or the SDU during local operation at distances up to six meters (20 ft.).

1-13. HF SUBSYSTEM. The HF-SSB subsystem consists of Radio Set AN/URC-113, a HF whip antenna, a HF near-vertical-incident-skywave (NVIS) antenna, and required cables. The HF equipment provides voice operation on upper or lower sideband. The HF radio set (4, figure 1-3) may be operated on any one of 280,000 channels, and may be used for ground-to-ground or ground-to-air communications. It also provides automatic tuning and antenna impedance matching. It may be operated from its front panel during local (emergency) operations, or from the RSC-SDU interface during local (normal) or remote operations.

1-14. VHF-FM SUBSYSTEM. The VHF-FM subsystem consists of Receiver-Transmitter RT-524/VRC (RT-524) or RT-246/VRC (RT-246), a VHF BITE panel, a VHF-FM antenna (whip), and required cables. The VHF-FM equipment provides FM voice communication in the VHF range. The RT-524 and RT-246 are user supplied and operates on any one of 920 frequency channels in the 30.00 through 75.95 MHz band. The RT-246 (7, figure 1-3) is a remote controllable RT, and is capable of accepting up to ten preset channels. Once the preset channels have been manually loaded into RT-246, preset channel selection is possible via the RSC-SDU interface. The RT-524 is the manual version of the RT-246. It does not have preset capabilities, and all frequencies must be manually entered via its front panel controls. The RSC-SDU interface with the RT-524, allows control of the transmit key and audio interface. Squelch selection for either RT remains at the RTs front panel. Both receiver-transmitters can be operated (locally) during emergency operation from their front panel controls. The VHF BITE panel 8, figure 1-3) is hard-mounted to the equipment mounting rack. The VHF BITE panel monitors the rf output power for drops more than 3 dB below the minimum specified rf power. The VHF BITE panel also provides audio and COMSEC interface signal conditioning.

1-15. VHF-AM SUBSYSTEM. The VHF-AM subsystem consists of Radio Set AN/VRC-83(V)1, a VHF/UHF antenna, and required cables. The VHF-AM equipment provides AM voice, ground-to-air communications in the VHF range. The VHF-AM radio set (9, figure 1-3) may be operated on any one of 1360 frequency channels in the 116.000 through 149.975 MHz frequency range. The VHF-AM radio set is capable of accepting up to eight preset channels and is remote controllable via the RSC-SDU interface. The VHF-AM radio set can also be operated (locally) during emergency operation from its front panel controls.

1-16. UHF-AM SUBSYSTEM. The UHF-AM subsystem consists of Radio Set AN/VRC-83(V)1, a VHF/UHF antenna, and required cables. The UHF-AM equipment provides AM voice, ground-to-air communication in the UHF range. The UHF-AM radio set may be operated on any one of 7000 frequency channels in the 225.000 through 399.975 MHz frequency range. The UHF-AM radio set (2, figure 1-3) is capable of accepting up to eight preset channels and is remote controllable via the RSC-SDU interface. The UHF-AM radio set can also be operated (locally) during emergency operation from its front panel controls.

1-17. ANTENNA SYSTEMS. The Radio System uses three separate vehicle mounted antennas to receive and transmit in three communication bands. In addition to the three vehicle mounted antennas which can be used for fixed or mobile operation, a near-vertical-incident-skywave (NVIS) antenna kit is stowed in the vehicle for use as an HF fixed station antenna. The antenna installation procedures for both vehicles (M-151 or M-113) are contained in chapter 2. The four antennas supplied with each Radio System are shown in figure 1-4, and described in the following paragraphs.

a. HF (WHIP) Antenna. The HF whip antenna kit (AT-1011) consists of an eight section, 32 foot HF whip antenna and canvas transit bag. The antenna sections may be assembled to make either a 16 foot or 32 foot whip antenna. The 16 foot length is used for mobile or stationary operations, and the 32 foot length is used for stationary operations. The HF whip antenna is capable of operation over the frequency range of 2.0000 through 29.9999 MHz. Automatic tuning of the HF whip antenna is provided by the HF radio set amplifier-coupler.

b. HF (NVIS) Antenna. The HF NVIS propagation antenna kit (AS-2259/GR) consists of an eight section, 15 foot NVIS antenna, an antenna to antenna base adapter (MX-9313/GR) and canvas transit bag. The NVIS propagation antenna is capable of operation over the frequency range of 2.0000 through 14.0000 MHz. The NVIS antenna is used with the HF radio to increase the range above the distance that is normally possible with the HF whip antenna during stationary operation. Automatic tuning of the NVIS antenna is provided by HF radio set amplifier-coupler.

c. VHF-FM Antenna. The VHF-FM antenna (AS-1729/VRC) consists of a center-fed whip antenna. The antenna is used for mobile or stationary operation over the frequency range of 30.00 through 75.95 MHz. The base compensation network provides control of the input VSWR.

d. VHF/UHF Antenna. The VHF/UHF antenna (AS-3588/GRC-206) is a combined VHF/UHF antenna with separate UHF and VHF ports on the antenna base. The antenna is capable of operation over the frequency range of 116.000 through 149.975 MHz (VHF), and 225.000 through 399.975 MHz (UHF). The VHF/UHF antenna is vertically polarized and produces an omnidirectional peak radiation pattern.

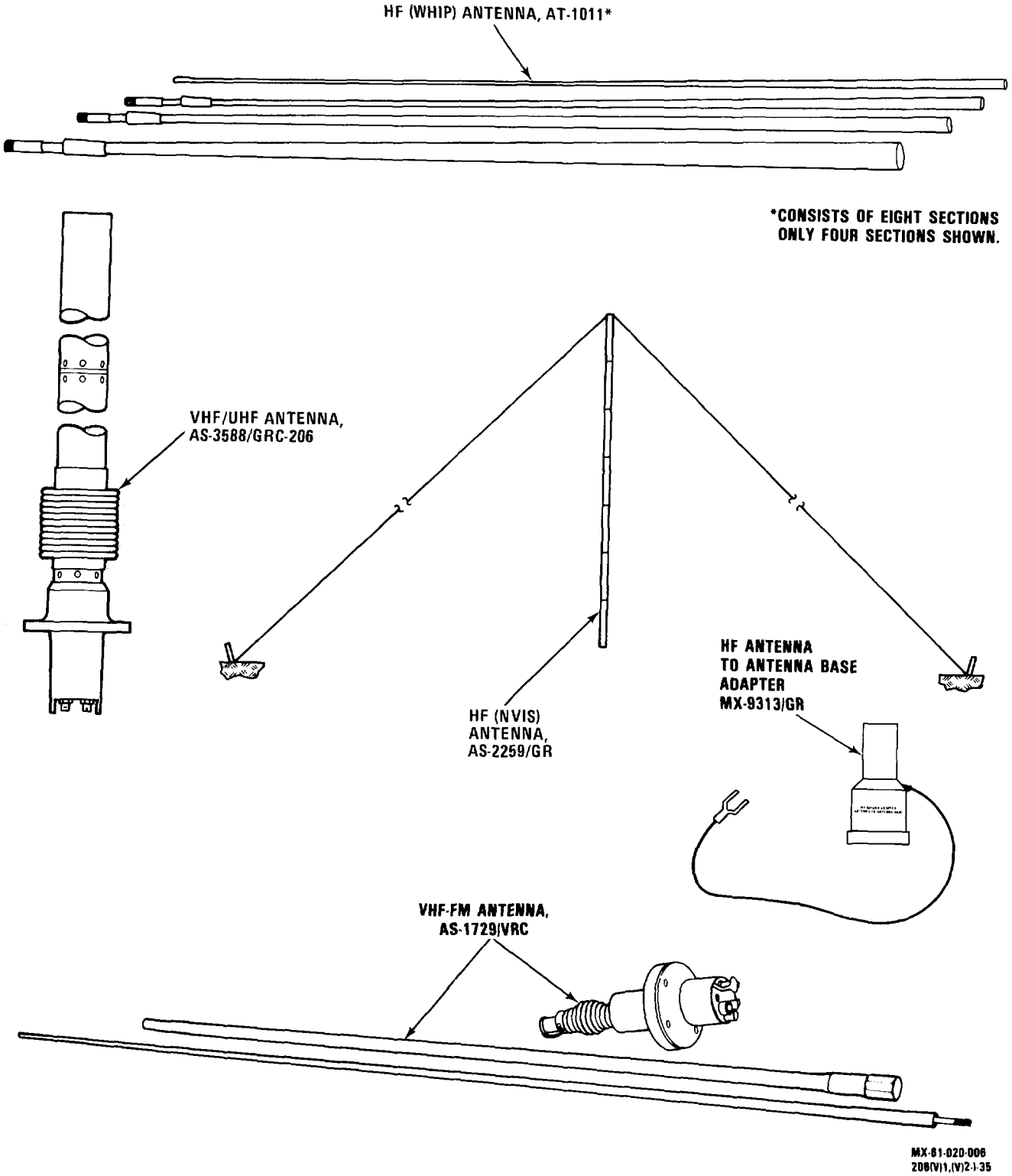


Figure 1-4. Radio System Antennas

1-18. ACCESSORY AND ANCILLARY EQUIPMENT STOWAGE. Two installation kits (one for each type vehicle M-113 or M-151 with M-416 trailer) are provided with each Radio System. The installation kits contain the necessary tie downs, mounting plates or holding fixtures to provide physical security for equipment during transport or mobile operations. The mounted locations of stowed equipment is contained in chapter 2. Refer to figure 1-5 and the following paragraphs for the description and purpose of accessory or ancillary equipment.

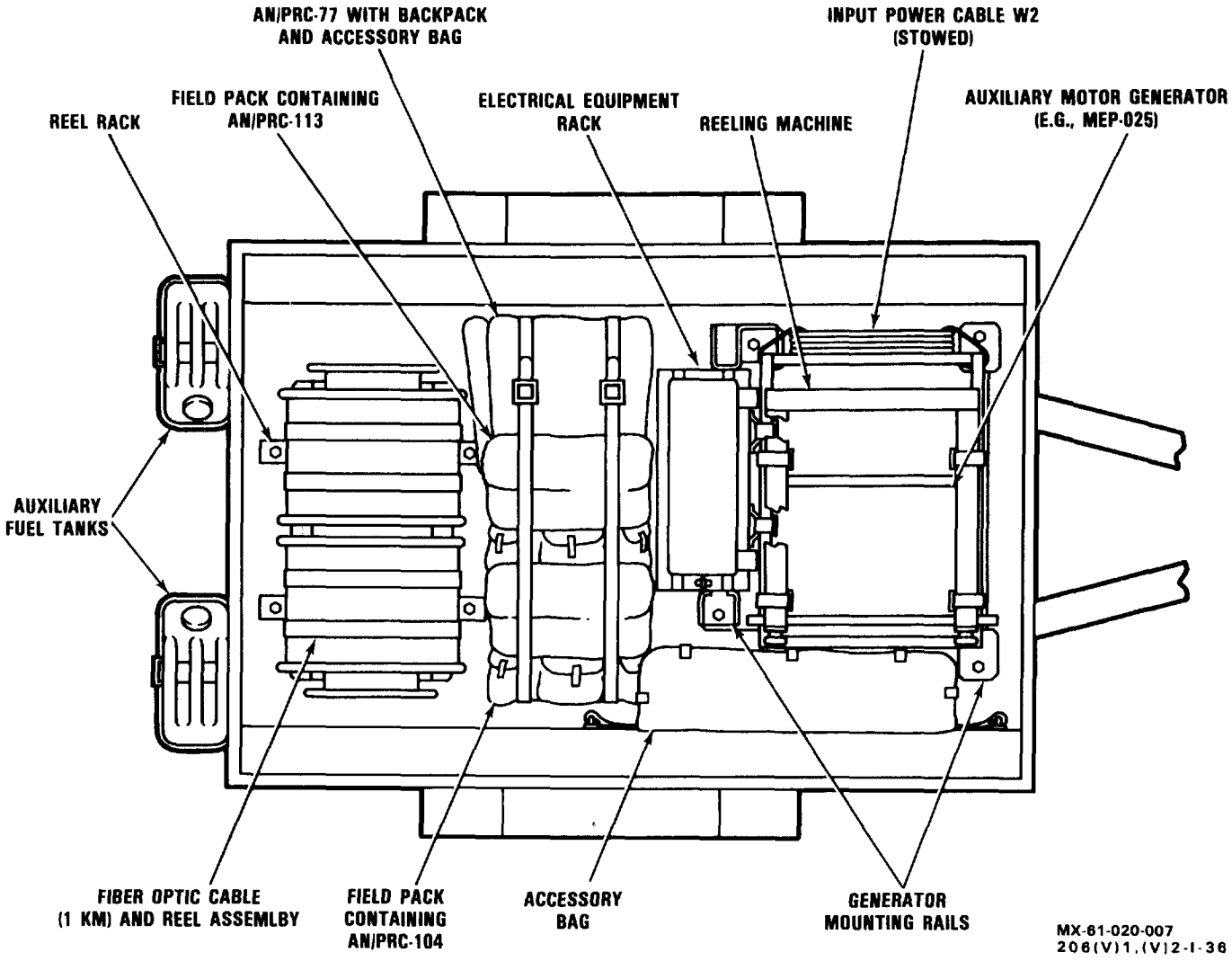


Figure 1-5. Accessory and Ancillary Equipment Installed in the M-416 Trailer

a. Reel Rack. The reel rack is the mechanical interface used to mount the F/O cables and reel assemblies in the M-113 vehicle or M-416 trailer. The reel rack is made of lightweight aluminum. It consolidates the mounted equipment for stowage and provides physical security during transport or mobile operations.

b. Fiber Optic Cables and Reel Assemblies. Two 1 km fiber optic (F/O) cables with reel assemblies are provided with each Radio System. The two F/O cables and

reel assemblies allow remote deployment of one RSC to a distance of 2 km (6,562 feet), or two RSCs to be deployed up to 1 km (3,281 feet) each. The weight of one F/O cable and reel assembly is approximately 61 pounds (27.7 kg).

c. Electrical Equipment Rack. The electrical equipment rack provides stowage provisions for COMSEC equipment used with Radio Communication System AN/GRC-206(V)1. The electrical equipment rack has provisions for storing two TSEC/KY-57's, one TSEC/KY-65, and the associated vehicle power adapters required for COMSEC equipment operation. A security hasp is incorporated on the rack to accommodate a user supplied padlock to prevent pilferage. The electrical equipment rack is physically secured to the vehicle (M-113 or M-416 trailer) with mounting hardware.

d. Accessory Bag. An accessory bag is provided to stow and transport the optional HF antenna, vehicle installation kits, and other mounting hardware. The accessory bag is physically secured to the vehicle (M-113 or M-416 trailer) with retaining straps.

e. AN/PRC-77 with Backpack and Accessory Bag. The AN/PRC-77 (PRC-77) with backpack and accessory bag is user supplied. The radio set is a portable manpack, battery operated, frequency modulated (FM) equipment. It provides short range voice communications on 920 channels over a frequency range of 30.00 to 75.95 megahertz. The PRC-77 with backpack and accessory bag is physically secured to the vehicle with retaining straps. For a detailed description of Radio Set AN/PRC-77, refer to the related technical manuals listed in table 1-8.

f. AN/PRC-104 with Field Pack. A user supplied field pack containing Radio Set AN/PRC-104 (PRC-104) is stowed in the vehicle. The radio set is a portable manpack, battery operated, single sideband (SSB) equipment. It provides short range voice communications on 280,000 channels over a frequency range of 2.0000 to 29.9999 MHz. The PRC-104 with field pack is physically secured to the vehicle with retaining straps. For a detailed description of Radio Set AN/PRC-104, refer to the related technical manuals listed in table 1-8.

g. AN/PRC-113 with Field Pack. A user supplied field pack containing Radio Set AN/PRC-113 (PRC-113) is stowed in the vehicle. The radio set is a portable manpack, battery operated, amplitude modulated (AM) equipment. It provides short range voice communications on 1360 VHF channels and 7000 UHF channels. It operates over a VHF frequency range of 116.000 to 149.975 MHz, and over a UHF frequency range of 225.000 to 399.975 MHz. The PRC-113 with field pack is physically secured to the vehicle with retaining straps. For a detailed description of Radio Set AN/PRC-113, refer to the related technical manuals listed in table 1-8.

h. Auxiliary Motor Generator. A user supplied auxiliary motor generator is required as an alternate power source during stationary operations. The auxiliary motor generator is gasoline powered and supplies +27.5 Vdc at 1500 watts to the Radio System via a 50 foot power cable. The auxiliary motor generator is mounted in either vehicle by using the generator mounting rails supplied with the Radio System. For a detailed description of Motor Generator MEP-025, refer to the related technical manuals listed in table 1-8.

i. Generator Mounting Rails. The generator mounting rails are the mechanical interface used to physically secure the auxiliary motor generator to the vehicle. It allows the auxillary motor generator to be installed in the M-113 vehicle using existing hardware and bolt patterns.

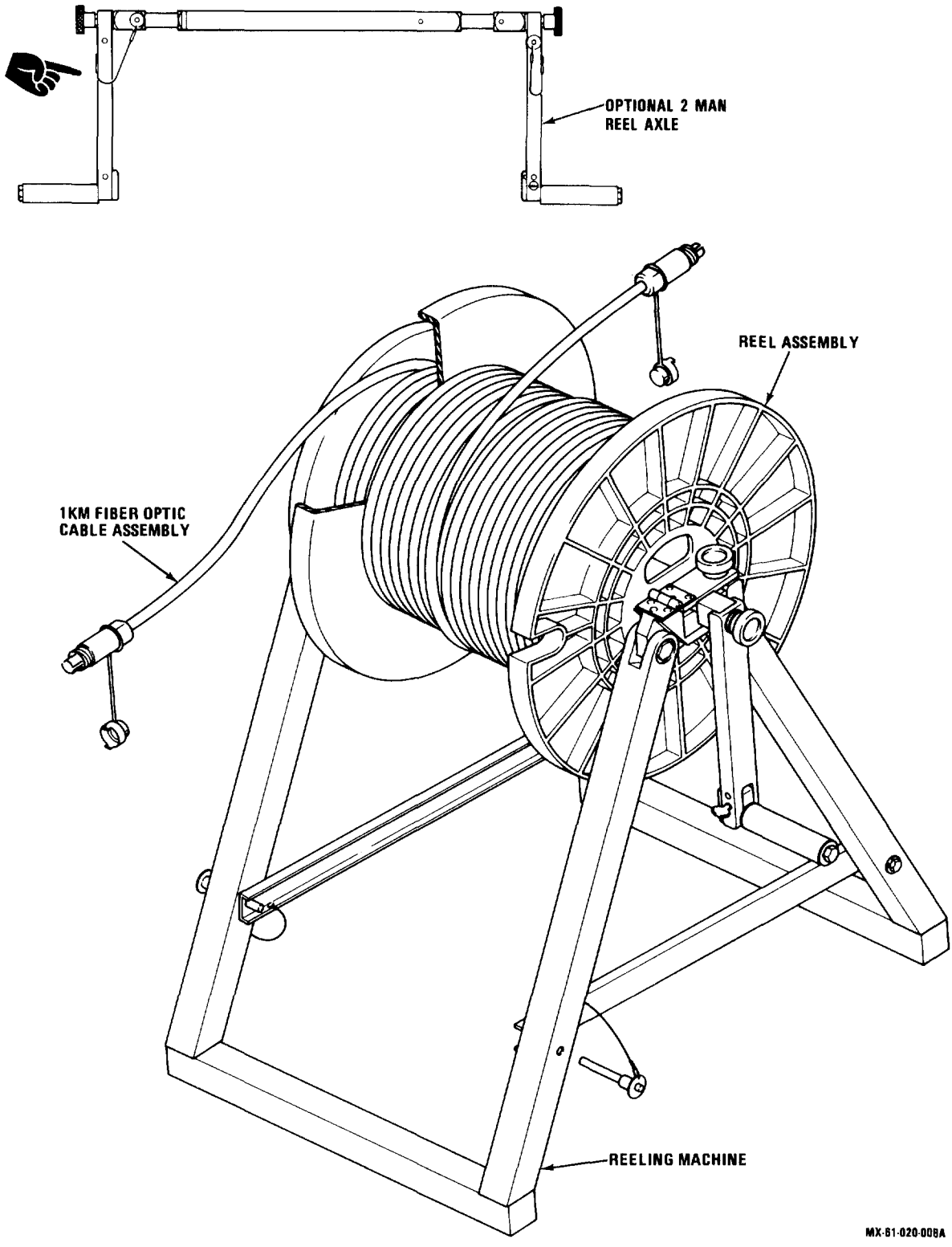


Figure 1-6. Reeling Machine with Fiber Optic Cable and Reel Assembly

j. Auxiliary Fuel Tanks. Two user supplied auxiliary fuel tanks (MIL-C-1283) are required to store gasoline for operating the auxiliary motor generator. The auxiliary fuel tanks are mounted outside the vehicle with mounting hardware and/or retaining straps.

k. Handsets. Four H-250/U handsets are supplied with the Radio System. The handsets are physically and electrically compatible with the audio input-output connectors on the RF subsystems and RSCs. The H-250/U handsets are stowed in the storage box of the equipment mounting rack.

l. Reeling Machine. The reeling machine (figure 1-6) is a mechanical A-frame assembly supplied with the Radio System to aid in recovering F/O cables deployed during remote operations. It is equipped with adjustable handle and legs which can be folded and secured to allow for easy stowage in the M-113 vehicle or the M-416 trailer. When not in use, the reeling machine is physically secured in the vehicle with retaining straps.

1-19. COMSEC EQUIPMENT COMPATIBILITY. Radio Communication System AN/GRC-206(V)1 has provisions to operate in clear or secure voice modes. Mechanical and electrical interfaces are provided with Radio Communication System AN/GRC-206(V)1 to mount and operate user supplied COMSEC equipment. When the Radio System is configured for secure voice operation, audio input-output signals are via compatible voice ciphering equipment (KY-65 or KY-57 COMSEC equipment). Visual indicators are provided on the RSC front panel to indicate text status (plain or cipher) of each RF subsystem.

1-20. LEADING PARTICULARS. The leading particulars for the Radio System is contained in table 1-3. The characteristics and descriptions given in table 1-3 are identical for both Radio Systems except where noted.

1-21. CAPABILITIES AND LIMITATIONS. Table 1-4 contains the capabilities and limitations for the Radio System.

1-22. EQUIPMENT SUPPLIED. Table 1-5 lists all units, major components, accessories and cables supplied with the Radio System. The supplied equipment is used with both Radio Systems except where noted.

1-23. EQUIPMENT REQUIRED BUT NOT SUPPLIED. Table 1-6 lists the equipment required to service or support the Radio System, but is not supplied. The equipment listed is required for both Radio Systems except where noted.

1-24. TEST EQUIPMENT. Table 1-7 lists the required test equipment.

1-25. RELATED TECHNICAL MANUALS. Table 1-8 lists the related technical manuals by publication titles, publication numbers, and equipment nomenclature.

Table 1-3. Leading Particulars

Characteristics	Description
PRIMARY POWER REQUIREMENTS	
Input power	+22.5 to +30.0 Vdc at 1500 watts (maximum)
Power available	
M-151 vehicle alternator	+28.0 Vdc at 1500 watts
M-113 vehicle alternator	+28.0 Vdc at 1500 watts
Auxiliary motor generator (MEP-025) MIL-G-52732/5 (MEP-026) MIL-G-52732/8	+27.5 Vdc at 1500 watts
Power required	
All equipment on (two transmitters keyed)	1500 watts, maximum
(four transmitters keyed)	1500 watts, maximum with +28 Vdc input @ 50A
All equipment on	150 watts, average
HF Radio Set	
Transmit	525 watts, maximum
Receive	30 watts, maximum
VHF-FM Radio	
Transmit	300 watts, maximum
Receive	50 watts, nominal
VHF-AM Radio Set	
Transmit	275 watts, maximum
Receive	30 watts, nominal
UHF-AM Radio Set	
Transmit	275 watts, maximum
Receive	30 watts, nominal
EQUIPMENT DIMENSIONS AND WEIGHT	
Electrical equipment mounting base MT-6250/GRC-206	
Width	38 inches (96.52 cm)
Height	31 inches (78.74 cm)
Depth	16 inches (40.64 cm)
Weight*, (MT-6250/GRC-206)	368 lbs. (167 kg)
(MT-6250A/GRC-206)	308 lbs. (140 kg)

*includes all radio equipment.

Table 1-3. Leading Particulars-Continued

Characteristics	Description
Control, signal distribution unit C-11169/GRC-206	
Width	7.50 inches (19.05 cm)
Height	7.50 inches (19.05 cm)
Depth	9.08 inches (22.98 cm)
Weight	12.5 lbs (5.68 kg)
Switchboard, power SB-4151/ GRC-206	
Width	7.50 inches (19.05 cm)
Height	7.50 inches (19.05 cm)
Depth	9.82 inches (24.9 cm)
Weight	10.5 lbs (4.77 kg)
Control, Radio Set C-11166/ GRC-206, (2 ea)	
Width	12.06 inches (30.63 cm)
Height	8.06 inches (20.47 cm)
Depth	5.33 inches (13.54 cm)
Weight	15.06 lbs (6.8 kg) - without batteries 19.51 lbs (8.85 kg) - with BA-5590 batteries 23.02 lbs (10.4 kg) - with BB-590 batteries
Radio Set, AN/URC-113	
Width	14.00 inches (35.56 cm)
Height	7.58 inches (19.25 cm)
Depth	15.25 inches (38.74 cm)
Weight	37.4 lbs (16.96 kg)
Radio Set, AN/VRC-83(V)1, (2 ea)	
Width	10.37 inches (26.34 cm)
Height	6.50 inches (16.51 cm)
Depth	12.50 inches (31.75 cm)
Weight	33.9 lbs (15.38 kg)
Receiver-Transmitter, Radio RT-246/VRC and RT-524/VRC	
Width	15.93 inches (40.46 cm)
Height	6.75 inches (17.15 cm)
Depth	14.00 inches (35.56 cm)
Weight, RT-246	61 lbs (27.67 kg)
RT-524	58 lbs (26.31 kg)

Table 1-3. Leading Particulars-Continued

Characteristics	Description
Rack, Electrical Equipment MT-6251/GRC-206	
Width	21.0 inches (53.34 cm)
Height	20.0 inches (50.8 cm)
Depth	8.25 inches (20.96 cm)
Weight	10.0 lbs (4.54 kg)

Table 1-4. Capabilities and Limitations

Capability/limitation	Description
Primary power limitations	Gasoline generator, 24-hour operation without additional fuel (10 gallon of gasoline, approx. 24-hour supply, normally stowed outside vehicle). Vehicle battery, emergency operation only.
VHF-FM subsystem	
Frequency range	30.00 MHz to 75.95 MHz at 0.05 MHz intervals
Available channels	920 channels
Preset channels	10 (RT-246, only)
Output power	
Low power High power	10 watts (maximum) 35 watts (minimum)
Antenna impedance	50 ohms; BNC receptacle
Type of modulation	Frequency modulation (FM)
Mode of operation	Voice, X-mode (for digital data and secure voice communications)
VHF-AM subsystem	
Frequency range	116.000 MHz to 149.975 MHz at 25 kHz intervals
Available channels	1360 channels
Preset channels	8 using, nonvolatile, electronic memory
Output power (nominal)	30 watts
Output power (bypass)	2 watts or 10 watts (operator selectable)
Antenna impedance	50 ohms
Type of modulation	Amplitude modulation (AM)
Mode of operation	Voice, secure voice, tone
UHF-AM subsystem	
Frequency range	225.000 MHz to 399.975 MHz at 25 kHz intervals
Available channels	7000 channels

Table 1-4. Capabilities and Limitations-Continued

Capability/limitation	Description
UHF-AM subsystem-Continued	
Guard receiver	243.000 MHz
Preset channels	8 using, nonvolatile, electronic memory
Output power (nominal)	30 watts
Output power (bypass)	2 watts or 10 watts (operator selectable at radio)
Antenna impedance	50 ohms
Type of modulation	Amplitude modulation (AM)
Mode of operation	Voice, secure voice, tone
HF-SSB subsystem	
Frequency range	2.0000 MHz to 29.9999 MHz at 100 Hz intervals
Available channels	280,000 channels
Preset channels	None
Output power	150 watts average power
Antenna impedance	50 ohms at 15 MHz
Antenna tuning time	1.0 seconds typical; 5.0 seconds maximum
Type of modulation	SSB (upper and lower sidebands)
Mode of operation	Voice, secure voice, digital data

Table 1-5. Equipment Supplied

Nomenclature/common name	Purpose	Description
Control Equipment		
Power Switchboard SB-4151/ GRC-206 (SB-4151)	Conditions and distributes primary (+28 Vdc) power for Radio System.	Electrical equipment mounted in equipment mounting rack.
Signal Distribution Unit Control C-11169/GRC-206, (SDU)	Interfaces all control signals between all rf subsystems and the RSC.	Electrical equipment mounted in equipment mounting rack.
Radio Set Control C-11166/ GRC-206, (RSC)	Controls and monitors all rf subsystems of the Radio System. Also provides interface for audio input-output devices.	Electrical equipment mounted in vehicle (M-151 or M-113) using quick-release clamps. Two RSC's supplied with each Radio System.
HF-SSB Equipment		
Amplifier-Coupler, AM-7148/GRC-206, (AM-7148)	Houses Receiver-Exciter RT-1444, provides output power amplification and impedance matching for HF antennas.	Electrical equipment mounted in equipment mounting rack.
Cable Assembly, Audio 3W1	Interconnects audio signals between RT-1444 and AM-7148.	Multiconductor jacketed cable assembly approximately eight inches in length.
RT-1209 Remote Control Modification Kit	Modifies RT-1209 into RT-1444/URC for remote control capability.	Housing extension kit installed between the housing and control panel of RT-1444.
VHF-AM and UHF-AM Equipment		
Receiver-Transmitter RT-1319/URC, (RT-1319)	Used for VHF-AM and UHF-AM radio communications.	Receiver-Transmitter unit mounted on Radio Amplifier AM-7176/VRC-83. Two units supplied, one for VHF-AM operation, one for UHF-AM operation.
Radio Amplifier AM-7176/ VRC-83, (AM-7176)	Used to mount RT-1319 and provides output power amplification.	Power amplifier for RT-1319. Two units supplied, one for each RT-1319.

Table 1-5. Equipment Supplied-Continued

Nomenclature/common name	Purpose	Description
Equipment Mounting Rack		
Electrical Equipment Mounting Base, MT-6250/GRC-206 (Equipment Mounting Rack)	Mounts communication equipment for Radio Communication System AN/GRC-206(V)1.	Aluminum rack containing shock mounts, cables, storage drawer, VHF BITE, power junction unit, and COMSEC equipment mounts.
Electrical Equipment Mounting Base, MT-6250A/GRC-206 (Equipment Mounting Rack)	Mounts communication equipment for Radio Communication System AN/GRC-206(V)2.	Aluminum rack containing shock mounts, cables, storage drawer, VHF BITE, and power junction unit.
VHF BITE/Audio Interface (VHF BITE Panel)	Monitors RF output power from the VHF-FM Receiver-Transmitter.	VHF BITE panel hard-mounted to equipment mounting rack.
Power Junction Unit (PJU)	Distributes conditioned +28 Vdc to the LRU's.	Case mounted junction unit with individual distribution cables. Case is hard-mounted to equipment mounting rack.
Mount, HF PA/AC	Provides shock/vibration protection for HF Amplifier-Coupler AM-7148.	Shock mount hard mounted to equipment mounting rack.
Mount, VHF-FM (MT-1029/VRC)	Provides shock/vibration protection for VHF-FM Transceiver.	Shock mount hard mounted to equipment mounting rack. Mount is government furnished equipment (GFE).
Mount, VRC-83	Provides shock/vibration protection for Radio Set AN/VRC-83(V)1.	Shock mount hard mounted to equipment mounting rack; two supplied.
Mount, SB-4151/SDU	Provides shock/vibration protection for SB-4151 and SDU.	Shock mount hard mounted to equipment mounting rack.
Mount, KY-57	Provides electrical and mechanical interface for KY-57 and HYP-57 COMSEC equipment. Radio Communication System AN/GRC-206(V)1 only.	Mount hard mounted to equipment mounting rack; three supplied.

Table 1-5. Equipment Supplied-Continued

Nomenclature/common name	Purpose	Description
Equipment Mounting Rack-Continued		
Mount, KY-65, Z-AKH	Provides shock/vibration protection for KY-65 and Z-AKF COMSEC equipment. Used with Radio Communication System AN/GRC-206(V)1 only.	Shock mount hard mounted to equipment mounting rack. Mount is government furnished equipment (GFE).
Cable Assembly, Power Distribution, 4W1	Distributes power to HF Radio Set.	Multiconductor jacketed cable assembly.
Cable Assembly, Power Distribution, 4W2	Distributes power to KY-65 and Z-AKF COMSEC equipment. Used with AN/GRC-206(V)1 only.	Multiconductor jacketed cable assembly.
Cable Assembly, Power Distribution, 4W3	Distributes power to VHF-AM and UHF-AM Radio Set.	Multiconductor jacketed cable assembly; two supplied.
Cable Assembly, Power Distribution, 4W4	Distributes power to SDU.	Multiconductor jacketed cable assembly.
Cable Assembly, Power Distribution, 4W5	Distributes power to COMSEC equipment used with VHF-FM, VHF-AM, and UHF-AM Radio Set. Used on AN/GRC-206(V)1 only.	Multiconductor jacketed cable assembly; three supplied.
Cable Assembly, Power Distribution, 4W6	Distributes power to VHF-FM Mount, MT-1029/URC.	Multiconductor jacketed cable assembly.
Cable Assembly, SDU Control, 4W9	Interconnects control signals between SDU and HF Radio Set.	Multiconductor jacketed cable assembly.
Cable Assembly, SDU Audio, 4W10	Interconnects audio signals between RT-1444 and KY-65 COMSEC equipment. Used with AN/GRC-206(V)1, only.	Multiconductor jacketed cable assembly.
Cable Assembly, SDU Audio, 4W11	Interconnects audio signals between RT-1444 and SDU during nonsecure voice operation of the HF Radio Set.	Multiconductor jacketed cable assembly.

Table 1-5. Equipment Supplied-Continued

Nomenclature/common name	Purpose	Description
Equipment Mounting Rack-Continued		
Cable Assembly, SDU Audio, 4W11-Continued	Interconnects audio signals between KY-65 COMSEC equipment and SDU during secure voice operation of the HF Radio Set in AN/GRC-206(V)1.	
Cable Assembly, SDU Audio, 4W12	Interconnects audio signals between KY-57 COMSEC equipment and SDU during secure voice operation of the VHF-AM or UHF-AM Radio Set in AN/GRC-206(V)1. Interconnects audio signals between SDU and VHF-AM or UHF-AM Radio Set during nonsecure voice operation.	Multiconductor jacketed cable assembly; two supplied.
Cable Assembly, SDU Control, 4W13	Interconnects control signals between the SDU and the VHF-AM, or UHF-AM Radio Set.	Multiconductor jacketed cable assembly; two supplied.
Cable Assembly, SDU Audio, 4W14	Interconnects audio signals between KY-57 COMSEC equipment and VHF-AM or UHF-AM Radio Set during secure voice operations. Used on AN/GRC-206(V)1 only.	Multiconductor jacketed cable assembly; two supplied.
Cable Assembly, SDU Control, 4W15	Interconnects control signals between the VHF-FM Radio, VHF BITE panel, and the SDU.	Multiconductor jacketed cable assembly.
Cable Assembly, VHF-FM Antenna, 4W16	Interconnects rf signals between the VHF-FM BITE panel and the VHF-FM Radio.	Radio frequency cable assembly.

Table 1-5. Equipment Supplied-Continued

Nomenclature/common name	Purpose	Description
Equipment Mounting Rack-Continued		
Cable Assembly, SDU Audio, 4W17	Interconnects audio signals between SDU and VHF-FM Radio during nonsecure voice operation. Interconnects audio signals between KY-57 COMSEC equipment and the SDU during secure voice operation of the VHF-FM Radio in AN/GRC-206(V)1.	Multiconductor jacketed cable assembly.
Cable Assembly, SDU Control, 4W18	Interconnects control signals between the VHF BITE panel and KY-57 COMSEC equipment during secure voice operation of the VHF-FM Radio in AN/GRC-206(V)1.	Multiconductor jacketed cable assembly.
Cable Assembly, SDU Control, 4W19	Interconnects control signals between the VHF BITE panel and the VHF-FM Radio during secure voice operation of the VHF-FM Radio in AN/GRC-206(V)1.	Multiconductor jacketed cable assembly.
System Cable Assemblies		
Cable Assembly, Input Power, W1	Routes vehicle power to power switchboard SB-4151.	Multiconductor jacketed cable assembly.
Cable Assembly, Input Power, W2	Routes power from auxiliary motor generator to power switchboard SB-4151.	Multiconductor jacketed cable assembly approximately 50 feet in length.
Cable Assembly, RSC Power, W3	Routes power from SDU to RSC during local operation of the Radio System.	Multiconductor jacketed cable assembly; two supplied.

Table 1-5. Equipment Supplied-Continued

Nomenclature/common name	Purpose	Description
System Cable Assemblies-Continued		
Cable Assembly, HF Antenna, W4	Routes rf signals between HF antenna and HF Radio Set.	Radio frequency cable assembly.
Cable Assembly, VHF/UHF Antenna, W5	Routes rf signals between VHF/UHF antenna and UHF-AM Radio Set.	Radio frequency cable assembly.
Cable Assembly, VHF/UHF Antenna, W6	Routes rf signals between VHF/UHF antenna and VHF-AM Radio Set.	Radio frequency cable assembly.
Cable Assembly, VHF/FM Antenna, W7	Routes rf signals between VHF-FM antenna and VHF BITE panel.	Radio frequency cable assembly.
Cable Assembly, FM Antenna Control, W8	Interconnects control signals between VHF-FM antenna and VHF-FM Radio.	Multiconductor jacketed cable assembly.
Cable Assembly, Local Fiber Optic (F/O), W9	Interconnects audio and control signals between SDU and RSC during local operation.	Fiber optic cable assembly, approximately 20 ft (6 meters) in length.
Cable Assembly, Local Fiber Optic (F/O), W10	Interconnects audio and control signals between SDU and RSC during local operation.	Fiber optic cable assembly, approximately 50 ft (17 meters) in length.
Cable Assembly, Remote Fiber Optic (F/O), W11	Interconnects audio and control signals between SDU and RSC during remote operation.	Fiber optic cable assembly, approximately 3281 ft (1 km) in length; two supplied.
Cable Assembly, VIC-1 Audio, W12	Interconnects IC audio between the SDU and the intercommunication equipment (AM-1780/VRC) in the AM-113A1/A2 APC.	Multiconductor jacketed cable assembly used with the M-113 vehicle only.

Table 1-5. Equipment Supplied-Continued

Nomenclature/common name	Purpose	Description
Antenna System		
Antenna, HF (NVIS) AS-2259/GR	Used for reception and transmission in the frequency range of 2 to 14 MHz.	Eight piece sectional HF antenna with antenna to antenna base adapter.
Antenna, HF (WHIP) AT-1011	Used for reception and transmission in the frequency range of 2 to 29.9999 MHz.	Eight piece sectional HF antenna; government furnished equipment (GFE).
Base Assembly, HF Antenna	Prevents damage to HF (WHIP) antenna during mobile operation.	Self-erecting spring base.
Adapter, Antenna to Antenna Base (MX-9313/GR)	Adapts the HF (NVIS) antenna for vehicle mounting.	Adapter for mounting the HF (NVIS) antenna to the HF antenna base assembly.
VHF/UHF Antenna AS-3588/GRC-206	Used for reception and transmission in the frequency range of 116 to 149.975 MHz (VHF) and 225 to 399.975 MHz (UHF).	VHF/UHF antenna with two RF ports, one for VHF and one for UHF.
VHF-FM Antenna, AS-1729( )/VRC	Used for reception and transmission in the frequency range of 30 to 75.95 MHz.	Center-fed VHF-FM whip antenna; government furnished equipment (GFE).
Ancillary Equipment		
Electrical Equipment Rack MT-6251/GRC-206, (Electrical Equipment Rack)	Mounts COMSEC equipment not installed in equipment mounting rack. Used with Radio Communication System AN/GRC-206 (V)1 only.	Aluminum rack which stores optional COMSEC equipment.
Reel Rack	Used to mount and secure remote F/O cables and reel assemblies in vehicle.	Aluminum mount for remote F/O cables and reel assemblies.
Accessory Bag	Stores vehicle installation kits and other mounting hardware.	Cotton bag.

Table 1-5. Equipment Supplied-Continued

Nomenclature/common name	Purpose	Description
Ancillary Equipment-Continued		
Generator Mounting Rail	Mount for securing auxiliary motor generator to vehicle.	Two aluminum mounting rails.
M-151 Installation Kit	Kit for installing Radio System into M-151 vehicle and M-416 trailer.	Mounting brackets, clamps, straps, and antenna mounts necessary for Radio System installation.
M-113 Installation Kit	Kit for installing Radio System into M-113 APC.	Mounting brackets, clamps, straps, and antenna mounts necessary for Radio System installation.
Reeling Machine	Reeling unit for retrieving 1 km F/O cables.	Mechanical A-frame assembly with removable handle (crank) and adjustable brake (drag) set.
H-250/U Handset	Audio input-output device for the Radio System.	Handheld telephone styled communication device. The H-250/U handset is government furnished equipment (GFE).
Cleaning Kit MX PN 741889-801	Used to clean jewel ferrules and connectors of F/O modules and cables.	Polishing cleaner (MX PN 40-7212), optical cleaner (MX PN 3), paper lens (73), cleaner dispenser (MX PN 8564), and magnifying glass (MX PN N8184).

Table 1-6. Equipmnet Required But Not Supplied

Nomenclature /NSN	Purpose	Description
RT-246 Transceiver NSN: 5820-00-892-0623	Provides VHF-FM communications for the Radio System.	Optional VHF-FM Radio and is user supplied equipment.
Antenna Extender Bracket PN SC-D-446058	Raised VHF/FM antenna so it can be tied down for mobile operation.	Antenna Extender Bracket
RT-524 Transceiver NSN: 5820-00-892-0622	Provides VHF-FM communications for the Radio System.	Optional VHF-FM Radio and is user supplied equipment.
TSEC/KY-65 Speech Security Equipment NSN: 5810-01-050-2501	Provides secure voice capability for the HF Radio Set. Used with AN/GRC-206(V)1 only.	Speech security equipment and is user supplied.
TSEC/KY-57 Speech Security Equipment NSN: 5810-00-434-3644	Provides secure voice capability for the VHF-FM, VHF-AM and UHF-AM Radio Set. Used with Radio Communication System AN/GRC-206(V)1 only.	Speech security equipment and is user supplied; three required.
TSEC/HYP-57 Vehicle Power Adapter NSN: 5810-01-026-9621	Provides power for TSEC/KY-57 Speech Security equipment. Used with Radio Communication System AN/GRC-206(V)1 only.	Vehicle power adapter and is user supplied; three required.
Z-AKF Vehicle Power Supply NSN: 5810-01-050-2513	Provides power for TSEC/KY-65 Speech Security equipment. Used with Radio Communication System AN/GRC-206(V)1 only.	Vehicle power adaptor and is user supplied.
Battery BA-5590/U (Lithium) NSN: 6135-01-036-3495	Supplies power for RSC during remote operation.	Optional nonrechargeable battery and is user supplied equipment; two required for each RSC.
Battery BB-590/U (Nickel Cadmium) NSN: 6140-01-063-3918	Supplies power for RSC during remote operation.	Optional rechargeable battery and is user supplied equipment; two required for each RSC.
RT-1209/URC Receiver Transmitter Unit NSN: 5820-01-069-2638	Receiver-Exciter for HF Radio Set.	Receiver-Transmitter and is user supplied equipment.
M-113-A1/A2 Armored Personnel Carrier (APC) NSN: 2350-01-068-4077	Vehicle for installing Radio System.	Mobile Armored personnel carrier and is user supplied equipment.

Table 1-6. Equipment Required But Not Supplied-Continued

Nomenclature/NSN	Purpose	Description
M-151 1/4 Ton Utility Vehicle NSN: 2320-00-763-1092	Vehicle for installing Radio System.	1/4 ton utility vehicle (Jeep); user supplied equipment.
M-416 Trailer NSN: 2330-00-706-5495	Storage vehicle.	1/4 ton trailer; user supplied equipment.
Motor Generator MEP-025 FSN: 6115-017-8236	Provides auxiliary power for Radio System.	Auxillary motor generator; user supplied equipment.
Gasoline Can (Auxillary Fuel Tank) NSN: 7240-00-222-3088	Gasoline storage.	Auxillary fuel tank; two required.
Radio Set AN/PRC-104 NSN: 5820-01-027-9071	Tactical ground-to-ground, ground-to-air communications in HF band.	Portable HF Radio Set; user supplied equipment.
Radio Set AN/PRC-77 NSN: 5820-00-930-3724	Tactical ground-to-ground, ground-to-air communications in VHF band.	Portable VHF-FM Radio Set; user supplied equipment.
Radio Set AN/PRC-113 NSN: 5820-01-108-8839	Tactical ground-to-ground, ground-to-air communications in VHF/UHF band.	Portable VHF/UHF-AM Radio Set; user supplied equipment.
Pack, Field, Large NSN: 8465-01-019-9103	Storage container for radio set manpacks.	Cotton duct bag.
DH-132, Helmet, Armored Vehicle Crewman	Used as audio I/O device with Radio System installed in the APC.	User supplied equipment compatible with audio connectors on the RSC.
AN/PSC-2 Digital Communication Terminal (DCT)	Provides burst data transmission.	Hand held data equipment which provides means of composing/storing transmission and reception of data communication.

Table 1-6. Equipment Required But Not Supplied-Continued

Nomenclature/NSN	Purpose	Description
Rivnut Tool, Pneumatic (FSCM 03481) Header tool C-900 Pull-up stud (5/16-18) HP-18-3118 Pull-up stud (3/8-16) HP-18-3716 Anvil (5/16) P-83630 Anvil (3/8) P-83631	Used to install 5/16-18 and 3/8-16 inch rivnuts during preparation of the M-151 and M-416 vehicles for AN/GRC-206(V) installation.	Air pressure rivnut tool.
Rivnut Tool, Manual (FSCM 03481)		
C-722-5/16-18 NSN: 5120-01-099-0441	Used to install 5/16-18 rivnuts during preparation of the M-151 and M-416 vehicles for AN/GRC-206(V) intallation.	Manual 5/16-18 rivnut tool.
C-722-3/8-16 NSN: 5120-00-086-4262	Used to install 3/8-16 rivnuts during preparation of the M-151 and M-416 vehicles for AN/GRC-206(V) installation.	Manual 3/8-16 rivnut tool.
Battery Charger CA-135 MX PN 813781-801	Used to recharge battery packs of battery operated equipment.	Designed for charging BB-590/U type batteries. Six feet power cord with standard ac connector plug for 115 Vac, 60 Hz, single phase, 0.1 amp power source.
Battery Charger CA-136 MX PN 813780-801	Used to recharge battery packs of battery operated equipment.	Designed for charging BB-590/U type batteries. Six feet power cord with standard european ac connector plug for 220 Vac, 60 Hz, single phase, 0.05 amp power source.

Table 1-6. Equipment Required But Not Supplied-Continued

Nomenclature/NSN	Purpose	Description
Battery Charger CA-139 MX PN: 707579-801	Used to recharge battery packs of battery operated equipment.	Designed for charging BB-590/U type batteries. Six feet power cord with clamps for vehicle battery terminals and plug for automotive type cigarette lighter. Operates from 11 to 30 volts dc (0.6 amps at 12 Vdc and 0.3 amps at 28 Vdc, typical).
Battery Charger, dual NSN: 6130-01-182-1557ZX	Used to recharge battery packs of battery operated equipment.	Designed for charging/discharging two BB-590/U type batteries at a time. Six foot power cord with standard 115 VAC, 60HZ, single phase NEMA 5-15P connector plug. Battery charger can also be used with a European 220 VAC, 50HZ, single phase power source using a European power adapter supplied by the user. The input voltage selection from 115 VAC to 220 VAC is accomplished by changing the jumpers on the primary side of the transformer. This battery charger replaces PN: 813781-801 and PN: 813780-801 battery chargers.
*Screwdriver type torque wrench NSN: 5120-00-021-2041	Used during reassembly of Amplifier-Coupler AM-7148/GRC-206.	Adjustable, 2-36 inch pound in 2 inch-pound graduations, 1/4 inch hexagon socket drive. The tool length (less bit) is approximately 7.5 inches.
*Screwdriver type torque wrench kit NSN: 5180-01-007-8999	Used during reassembly of Amplifier-Coupler AM-7148/GRC-206.	Utica model TS-100, adjustable 2-100 inch-ounce wrench, in 2 inch-ounce graduations, with 1/4 inch hexagon socket drive.
*Cross-tip bit (MFR 81348) NSN: 5120-00-439-8277	Used during reassembly of Amplifier-Coupler AM-7148/GRC-206.	Type-2 cross-tip screwdriver bit with 1/4 inch hexagon adapter.
*Hexagon stock material	Used to install components of the power amplifier in Amplifier-Coupler AM-7148/GRC-206.	3/32 inch stock approximately 1 to 2 inches long with 1/4 inch hexagon adapter.

*An equivalent or alternate type may be used.

Table 5-7. Test Equipment List

Type designation	Alternate type designation	Figure and index no.	Nomenclature	Use
AN/GRM-116 P/N 707291-801	None	1-7	Radio Test Set	Interfaces with the UUT (RSC, SDU, VRC-83, HF-SSB, Fiber Optic Cables) providing input signals, interacting functions and status monitoring of the UUT.
P/N 707292-801	None	1-8	Test Set, Adapter Cable	Provides the necessary system interfaces with Radio AN/GRM-116 Test Set.
AN/GVM-9 P/N 707293-801	None	1-9	Receiver-Transmitter Test Set	Used to test the fiber optic modules and cables provides test points to monitor SDU power supply voltages.
AN/USM-398	Equivalent		Oscilloscope	Provides a means for visual measurement of frequencies and waveforms.
Fluke 8300A	Equivalent		Digital Multimeter	Provides a means for accurately measuring dc voltages.
HP-8640B	Equivalent		RF Signal Generator	Supplies rf signals for receiver sensitivity, audio power level test.
HP-436A	Equivalent		Power Meter	Provides a means to measure rf output power.
766-30 Narda	Equivalent		RF Attenuator	Attenuates output power for testing and troubleshooting.
765-20	Equivalent		RF Attenuator	Attenuates output power for testing and troubleshooting.
FP-50-6DB Texican	Equivalent		RF Attenuator	Attenuates output power for testing and troubleshooting.
HP-8482B	Equivalent		Power Sensor	Required with rf power meter.
HP-6268B	Equivalent		Power Supply	Supplies +28 Vdc prime power to equipment under test.
ME-57/U	Equivalent		Deviation Test Set	Use to test VHF-FM in transmit mode.
ME-426/U	Equivalent		RF Voltmeter	Provides a means to measure rf voltages.
CV 2343U	Equivalent		Balanced Mixer	Performance test checks and troubleshooting.
HP-5245L/5253B	Equivalent		Electronic Counter	Performance test checks and troubleshooting.
AN/GRM-115 P/N 707257-801	None		Radio Test Set	Performance test checks and troubleshooting of Radio System.

Type designation	Alternate type designation	Figure and index no.	Nomenclature	Use
HP-339A	Equivalent		Distortion Analyzer	Performance test checks and troubleshooting of Radio System.
P/N 172H-21A NSN: 6625-01-191-6915 P/N 622-1732-001	None	1-10	Antenna Simulator	Simulates 4.6m (15 ft) whip antenna over 2 to 29.99 MHz; 150 watt power handling capability.
OF-118/U P/N 707288-801	None		Test Adapter	Provides extender cables, adapters and power cable to permit maintenance of Radio Amplifier AM-7176/VRC-83.
KROHN-HITE 3700	Equivalent		Audio Filter	Performance test checks and troubleshooting.
BIRD 4381	Equivalent		Wattmeter	Provides a means to measure RF output power for HF-SSB and VHF-FM transmit tests.

Table 1-8. Related Technical Manuals

Publication numbers	Publication titles	Equipment nomenclature
TO 31R2-2PRC104-2	Field Maintenance Instructions Radio Set AN/PRC-104	Radio Set AN/PRC-104
TO 31R2-2URC-62	Maintenance Instructions with IPB, Receiver-Transmitter, Type RT-1319/URC	Receiver-Transmitter RT-1319/URC
TO 31R2-2VRC83-1	Operator's Manual Radio Set, Type AN/VRC-83(V)1	Radio Set AN/VRC-83(V)1
TO 31R2-2VRC83-2	Maintenance Instructions with IPB, Radio Set, Type AN/VRC83(V)1	Radio Set AN/VRC-83(V)1
TO 31R2-2PRC113-1	Operator's Manual Radio Set, Type AN/PRC-113(V)1	Radio Set AN/PRC-113 (V)1
TM 9-2320-218-10	Operation, Truck, Utility, 1/4 Ton, 4 x 4, M-151	M-151
TM 9-2320-218-20	Organizational Maintenance Manual for Truck, Utility, 1/4 Ton, 4 x 4, M-151 (2320-542-4783)	M-151
TO 35C2-3-385-11	Generator, Set, Gasoline, Engine Driver, 1.5 KW Air Cooled Skid Shock-Mounted, Tubular Frame (Less Engine)	MEP-025A gasoline generator
TM 9-2330-251-14P	Technical Manual for Trailer, Cargo, 1/4 Ton, 2W, M-416	M-416 Cargo Trailer
TO 31R-1-06-5	Mobile, Portable and Vehicular, Electronic Equipment Workunit Code Manual AN/GRC-206	
TO 31R2-2VRC-221	Operator's and Organizational Maintenance Manual	Radio Set AN/VRC-46 and Mount MT-1029/VRC
TO 31R2-2PRC77-1	Operator's and Organizational Maintenance Manual	Radio Set AN/PRC-77
TO 31R2-2PRC77-12	DS,GS and Depot Maintenance Manual	Radio Set AN/PRC-77
TO 31R2-2PRC104-2-1	Supplemental Field Maintenance Instructions	Receiver-Transmitter RT-1444/URC
TO 31R2-2PRC104-4-1	Supplemental Illustrated Parts Breakdown	Receiver-Transmitter RT-1444/URC

Table 1-8. Related Technical Manuals-Continued

Publication numbers	Publication titles	Equipment nomenclature
TO 31R2-2VRC-192 thru Change 4 with Sup C thru F	Field and Depot Maintenance Manual	Receiver-Transmitter Radio RT-246/VRC and RT-524/VRC
TM 11-5830-340-12	Operator and Organizational Maintenance Manual	Intercommunications Set AN/VIC-1(V)
TO 31R2-2GRC206-6WC-1	Scheduled Periodic Inspection Workcards, Radio Communication System AN/GRC-206(V)1 and AN/GRC-206(V)2.	Radio Communication System AN/GRC-206(V)1 and AN/GRC-206(V)2
TO 31R2-2VRC83-6WC-1	Scheduled Periodic Inspection Workcards, Radio Set AN/VRC-83(V)1.	Radio Set AN/VRC-83(V)1
TO 33D7-50-755-1	Operation and Maintenance Instructions with Illustrated Parts Breakdown, Test Adapter OF-118/U.	Test Adapter OF-118/U

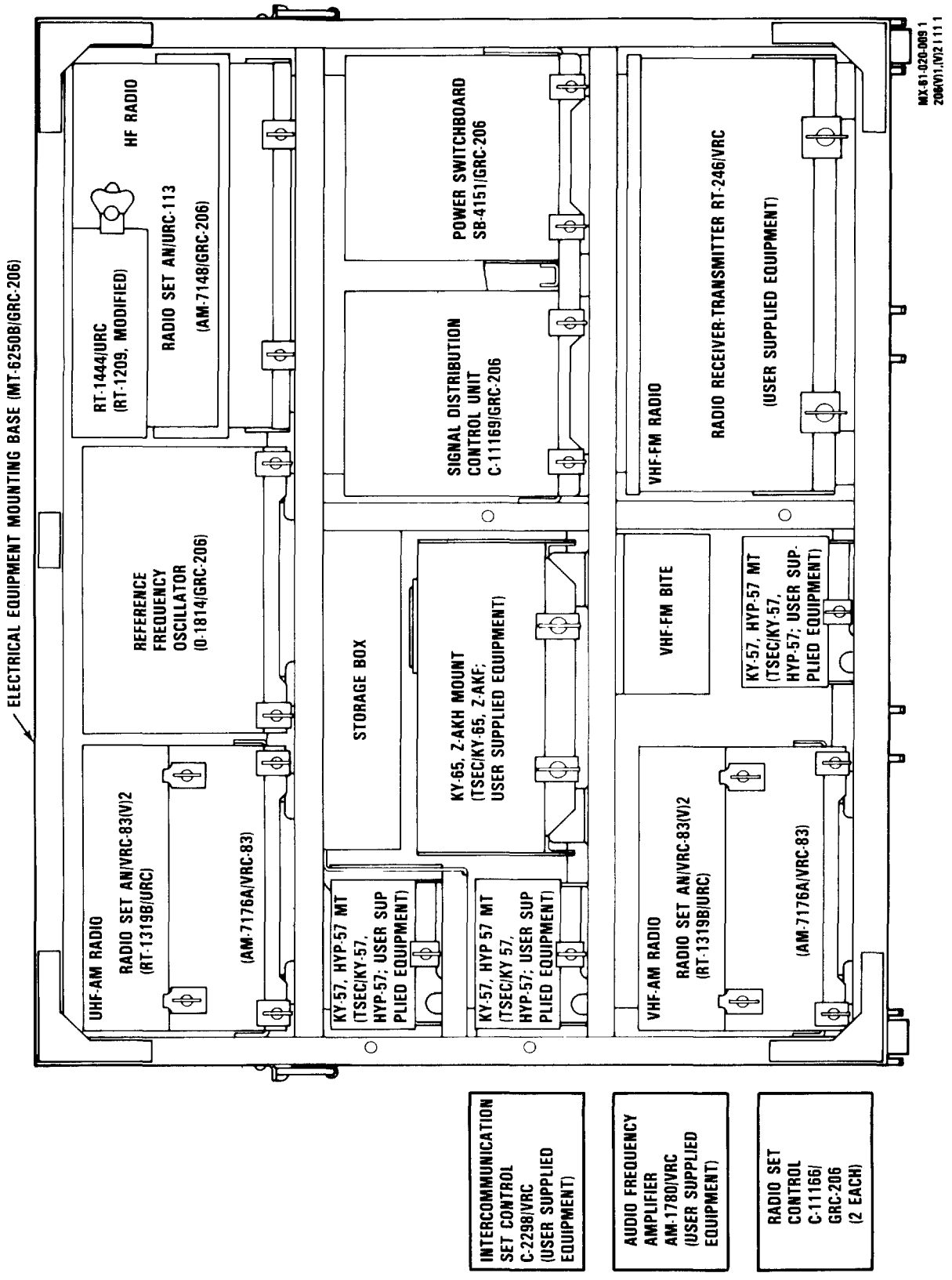
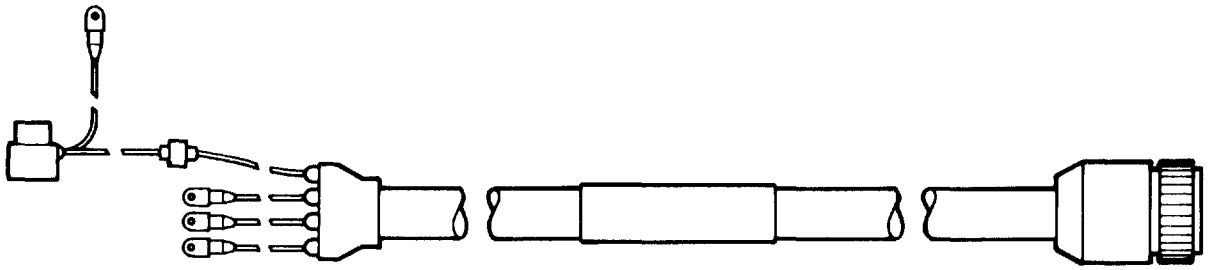
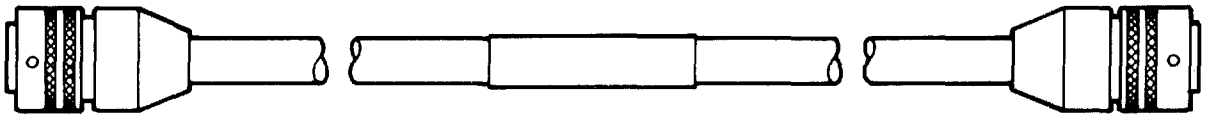


Figure 1-7. Radio AN/GRM-116 Test Set (Sheet 1 of 3)

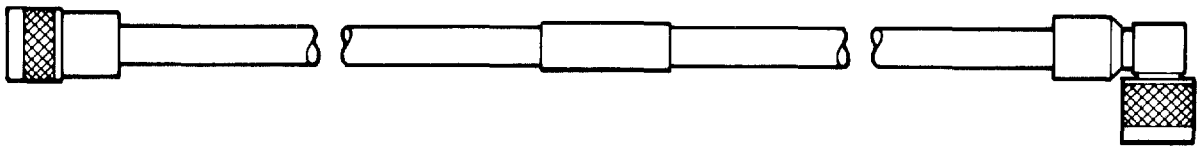


INPUT POWER CABLE ASSEMBLY (566073-801)



RSC POWER CABLE ASSEMBLY (566085-807) (2 SUPPLIED)

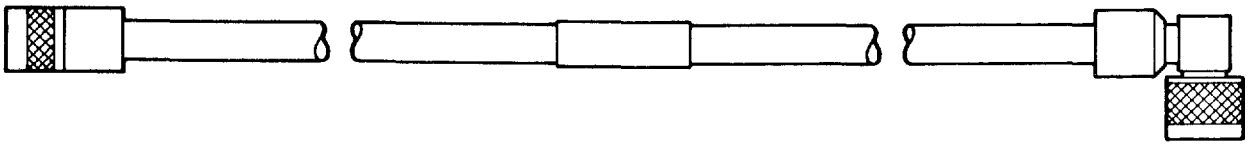
HF ANTENNA CABLE ASSEMBLY (566076-801)



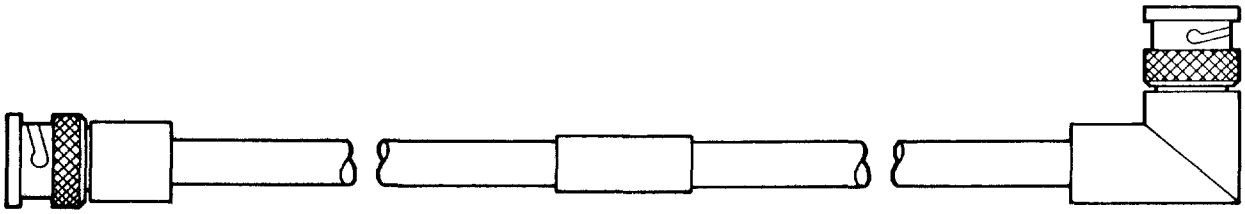
UHF ANTENNA CABLE ASSEMBLY (566077-801)

MX-61-020-009-2A

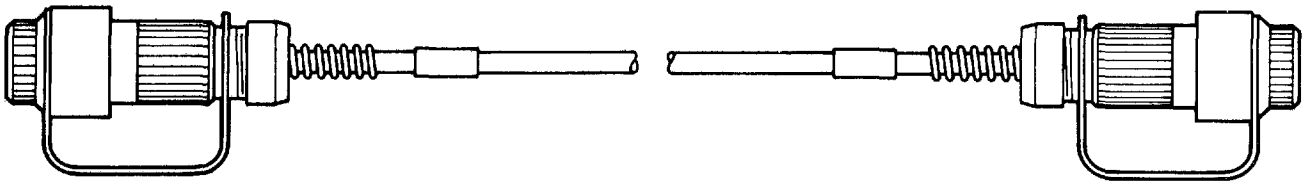
Figure 1-7. Radio AN/GRM-116 Test Set (Sheet 2 of 3)



VHF ANTENNA CABLE ASSEMBLY (566077-802)



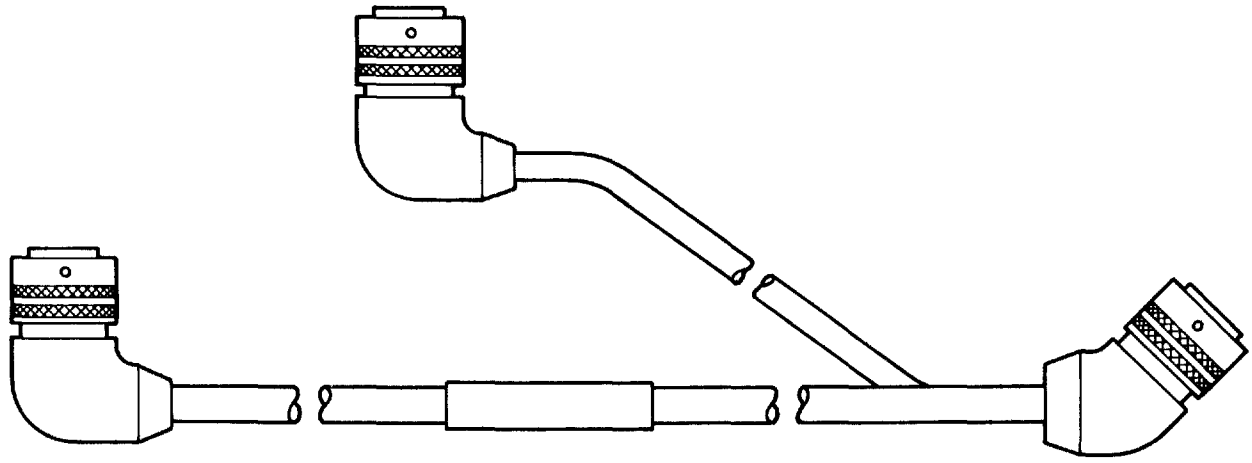
VHF-FM ANTENNA CABLE ASSEMBLY (566078-801)



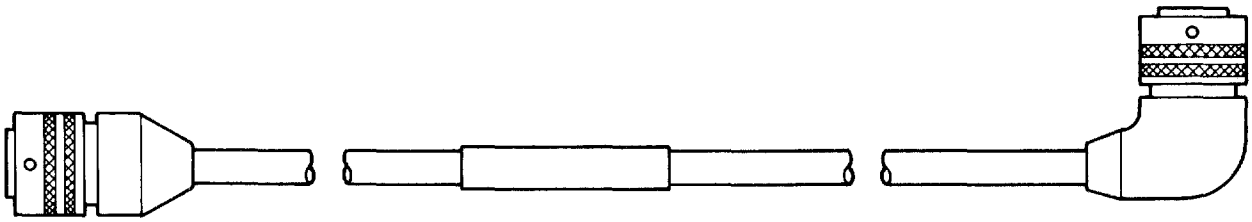
FIBER OPTIC CABLE ASSEMBLY (566080-802)

MX-61 020 009-3
206(V)1,(V)2-I 11 3

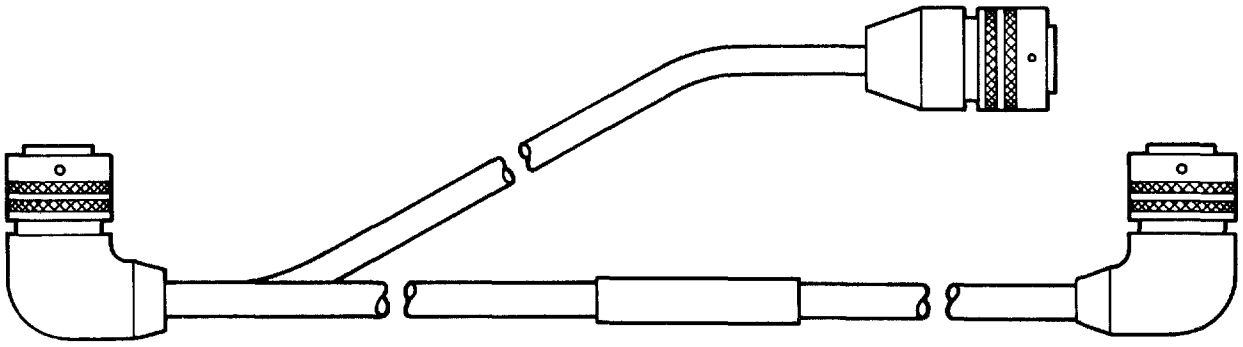
Figure 1-7. Radio AN/GRM-116 Test Set (Sheet 3 of 3)



HF CONTROL CABLE ASSEMBLY (566742-801)



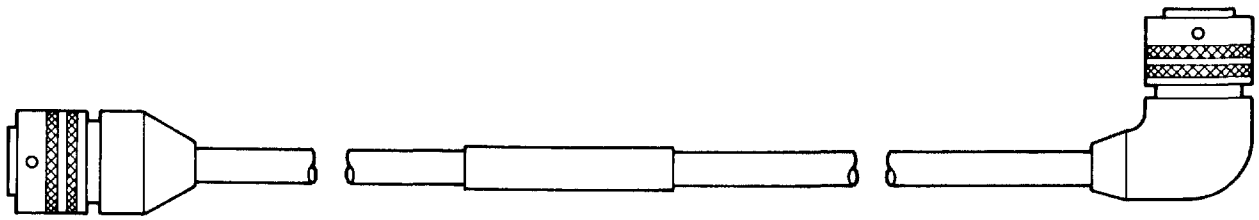
VRC-83 CONTROL CABLE ASSEMBLY (566742-802) (2 SUPPLIED)



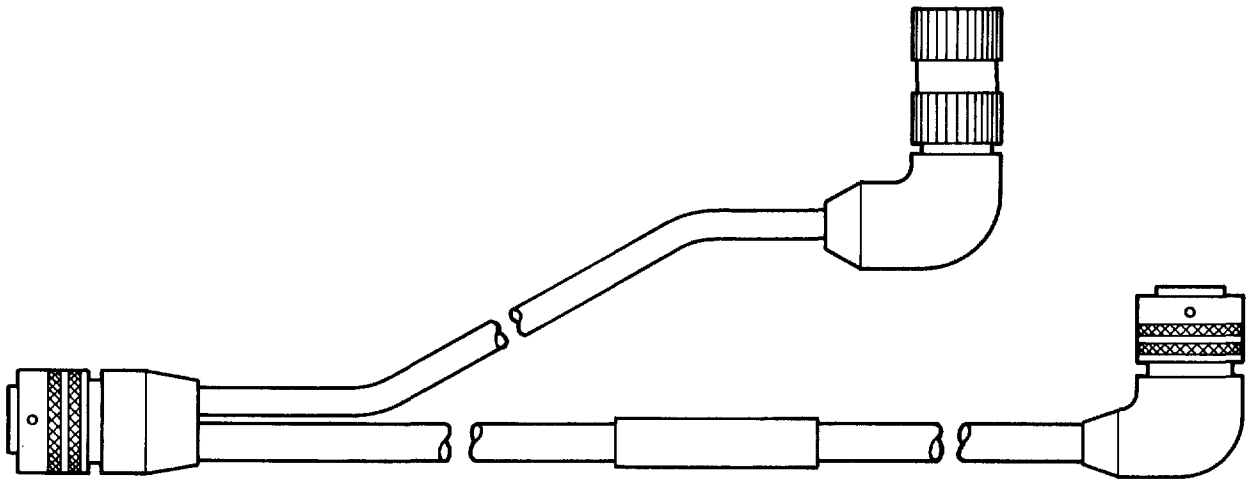
FM CONTROL CABLE ASSEMBLY (566742-803)

206(V)1,(V)2-1-12-1

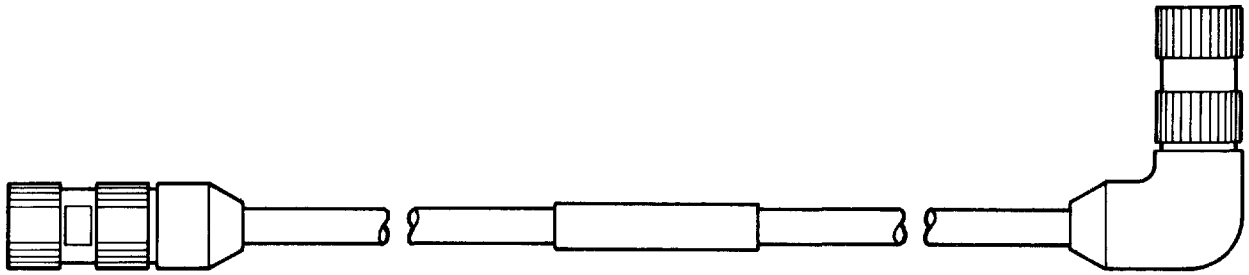
Figure 1-8. Adapter Cable Test Set (Sheet 1 of 4)



KY/BITE CONTROL CABLE ASSEMBLY (566742-804)



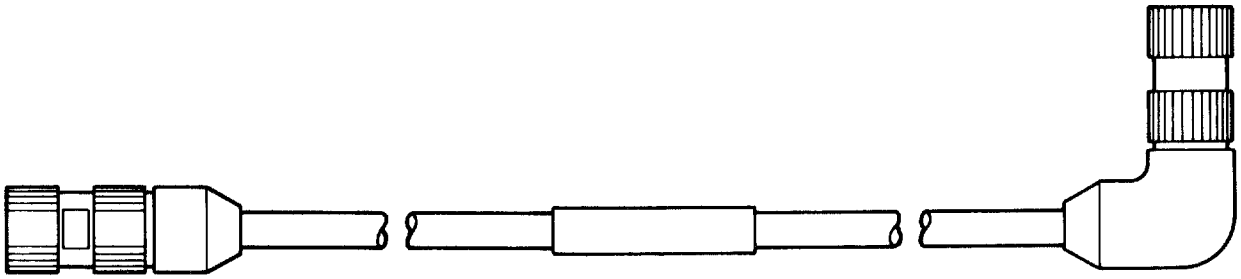
BITE/RT-246 CONTROL CABLE ASSEMBLY (566742-805)



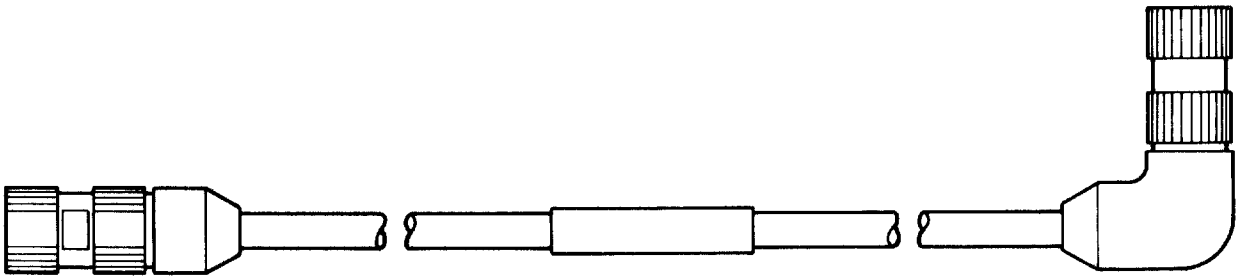
SDU/VRC AUDIO CABLE ASSEMBLY (566742-806) (2 SUPPLIED)

206(V)1,(V)2-1-12-2

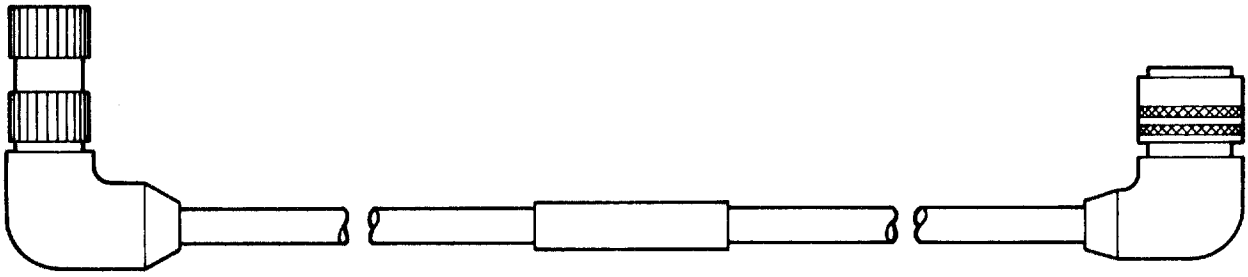
Figure 1-8. Adapter Cable Test Set (Sheet 2 of 4)



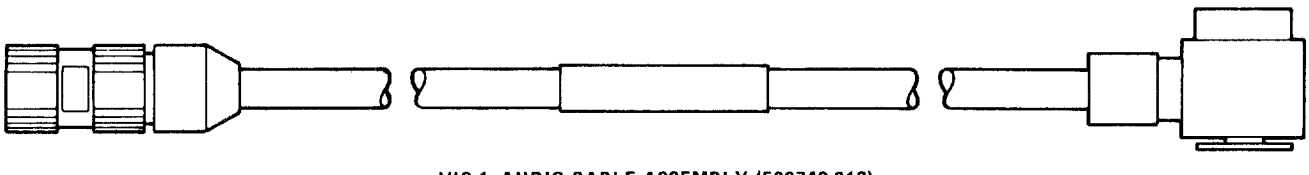
VHF/FM AUDIO CABLE ASSEMBLY (566742-807)



SDU/HF AUDIO CABLE ASSEMBLY (566742-808)



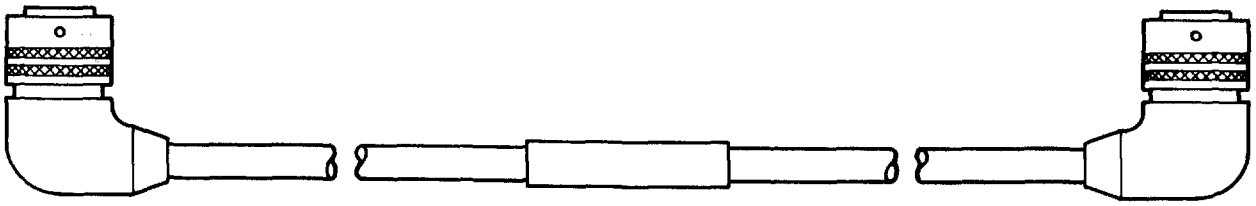
VRC/KY-57 AUDIO CABLE ASSEMBLY (566742-809)



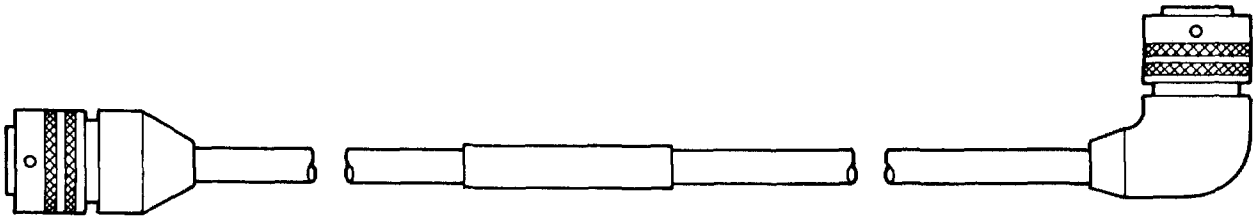
VIC-1 AUDIO CABLE ASSEMBLY (566742-810)

206(V)1,(V)2-I-12 3

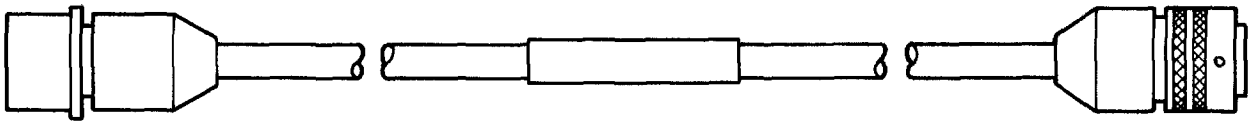
Figure 1-8. Adapter Cable Test Set (Sheet 3 of 4)



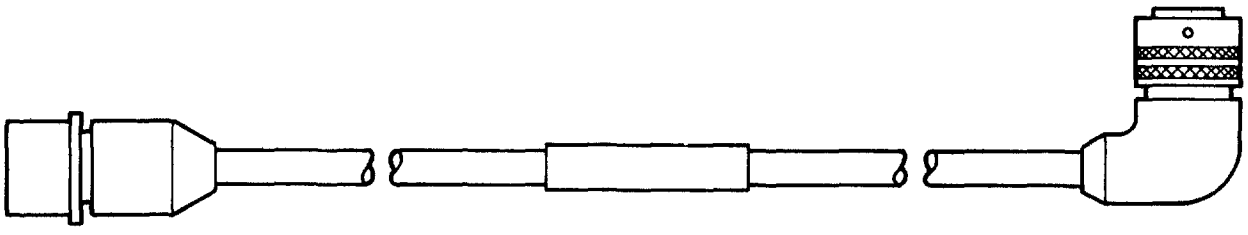
RFO POWER CABLE ASSEMBLY (566742-817)



RFO CONTROL CABLE ASSEMBLY (566742-818)



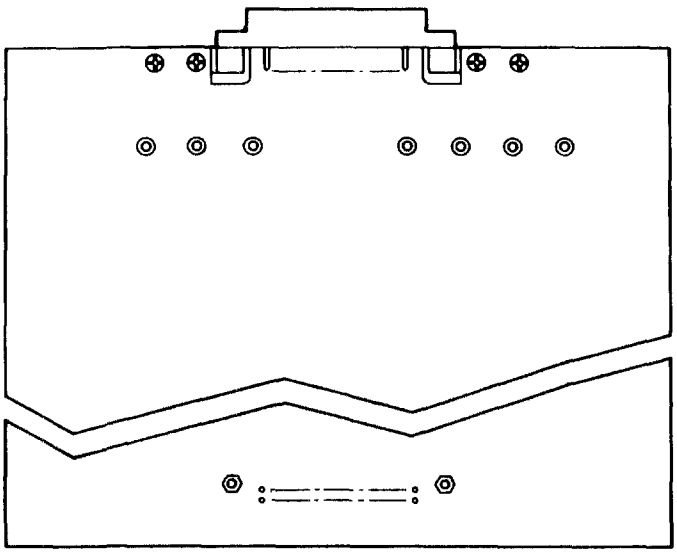
VRC-83 POWER CABLE ASSEMBLY (567490-801)



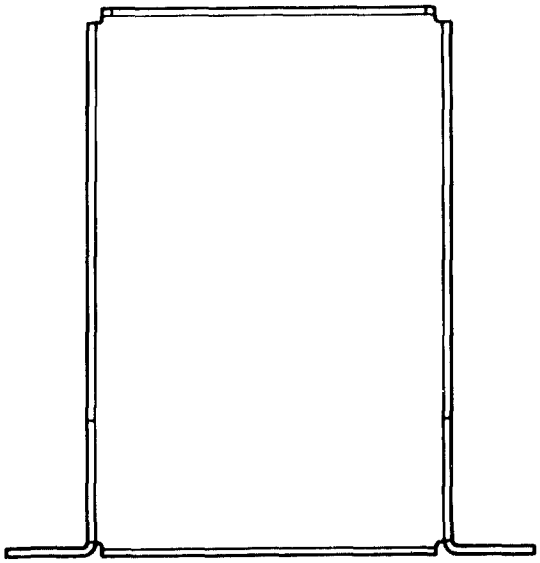
SDU POWER CABLE ASSEMBLY (567490-802)

206(V)1,(V)2-I-12-4

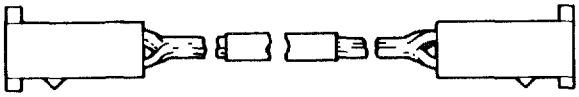
Figure 1-8. Adapter Cable Test Set (Sheet 4 of 4)



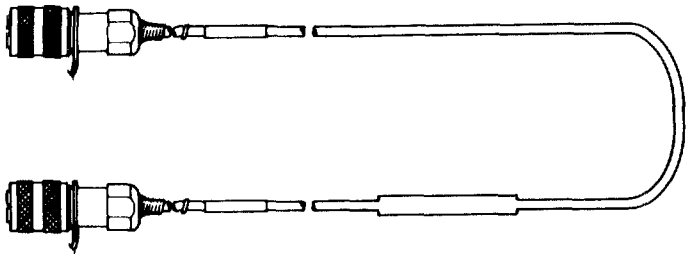
POWER SUPPLY EXTENDER ASSEMBLY



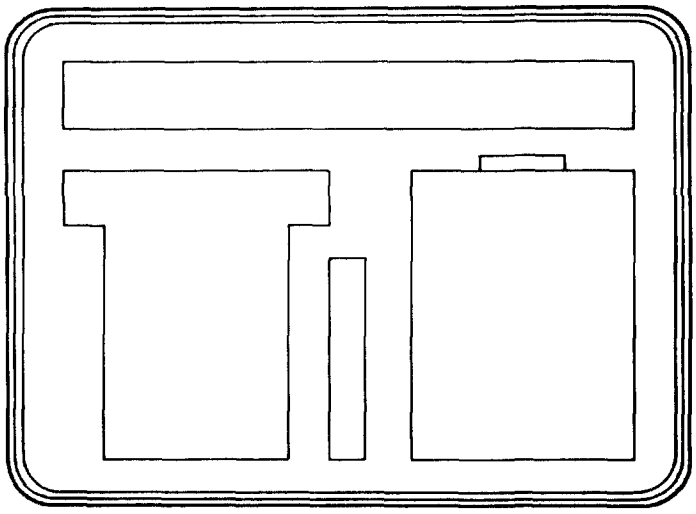
POWER SUPPLY SUPPORT BRACKET



FIBER OPTIC MODULE CABLE ASSEMBLY



OPTICAL ATTENUATOR CABLE ASSEMBLY



CASE ASSEMBLY

MX-61-020-010

Figure 1-9. Receiver-Transmitter AN/GVM-9 Test Set

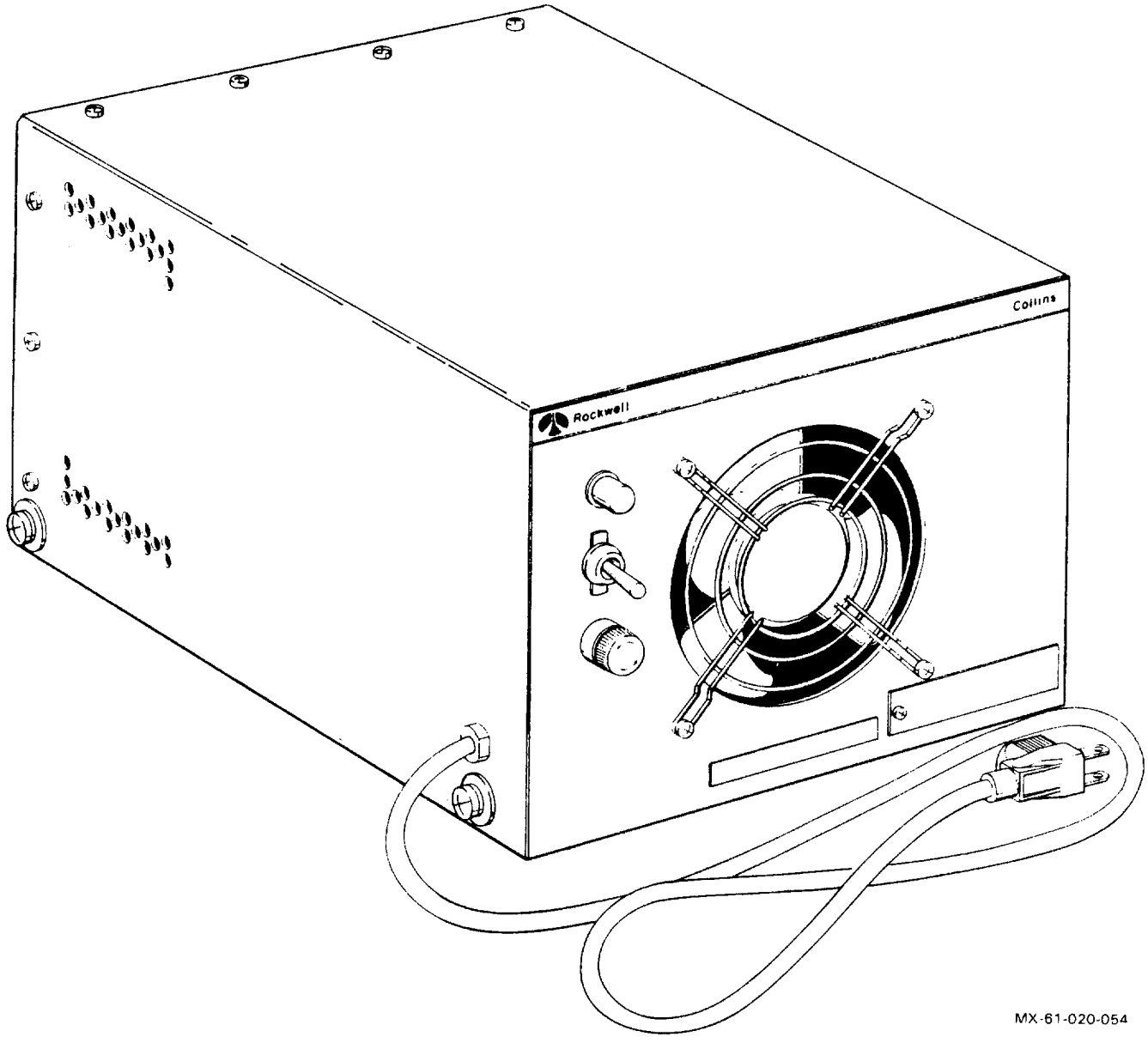


Figure 1-10. Antenna Simulator 172H-21A

CHAPTER 2

INSTALLATION

2-1. INTRODUCTION. This chapter contains information and instructions for receiving and accomplishing installation of the Radio System. This chapter is divided into two sections: Section I, Installation Logistics; and Section II, Installation Procedures.

Section I. INSTALLATION LOGISTICS

2-2. GENERAL. This section contains information relative to unloading, unpacking, material handling and interconnecting cable information.

2-3. UNLOADING AND UNPACKING. The Radio System components are packaged in individual containers, and shipped in a single wooden crate. Normal unloading and unpacking precautions should be observed. The original shipping containers and packing should be retained for further use, if reshipping or storage is required.

2-4. HOUSING. Components of the Radio System should be stored in a dry, dust free area, and in its original container and packing, if available.

2-5. RECEIVING DATA. Figure 2-1 illustrates the Radio System packing and pack assembly diagram. Table 2-1 provides a general lists of the major contents of the individual packages indexed in figure 2-1. For a detailed lists of supplied equipment (components, assemblies and attaching parts) refer to the consolidated pack list contained in the overall pack assembly. The items listed in table 2-1 apply to both Radio Systems except where specifically noted. The uncrated dimensions and weights of the Radio System components are listed in table 1-3.

2-6. MATERIAL HANDLING. The Radio System will be received as a consolidated package enclosed in a wooden crate and secured on a transport platform. A fork-lift with not less than one-half ton lift capability should be used to remove the consolidated package from the means of transport. After the consolidated package is removed from the means of transport, refer to table 2-1 which list the supplied equipment by container. Since the components of the Radio System are packaged in individual containers, no special material handling devices are required.

2-7. CABLES. Cables supplied with the Radio System are listed in table 2-2. The cables listed in table 2-2 apply to both Radio Systems except where specifically noted. All cables listed with a reference designation (prefix) of 4 are part of the equipment mounting rack, unit 4.

Table 2-1. Equipment Supplied

Item no.	Nomenclature/ common name	Part number/ FSN/NSN	Contents/ remarks
1	M-151 Installation kit	812134-801	Antenna mounts, brackets, M-151 preparation kit and attaching parts; two person lift required.
	Antenna AS-3588/GRC-206	626489-1	VHF/UHF antenna.
	Antenna AS-2259/GR	626500-1	HF (NVIS) antenna.
	Antenna base assembly	812069-801	HF antenna base assembly.
2	M-416 Preparation kit	741422-801	Strap loops and attaching parts; part of installation kit 812134-801.
3	Reeling machine	814445-801	Fiber optic cable reeling machine; part of installation kit 812134-801.
4	Reel rack	812100-801	Remote fiber optic cable rack; part of installation kit 812134-801.
5	Radio Set AN/URC-113	812083-801	Audio cable assembly 3W1 (PN 566084-806), RT-1209 remote control modification kit, and Amplifier-Coupler AM-7148/GRC-206.
6	Radio Set Control C-11166/GRC-206	812085-801	Radio set control (RSC); two supplied.
7	M-113 Installation kit	812139-801	Mounting brackets and attaching parts.
8	Electrical Equipment Rack MT-6251/GRC-206	812093-801	Radio stowage rack; not used with Radio Communication System AN/GRC-206(V)2.
9	Reference Frequency Oscillator O-1814/GRC-206	707243-801	Reference frequency oscillator (RFO); used with Radio Communication System AN/GRC-206(V)3 only.
10	Power Switchboard SB-4151/GRC-206	812082-801	Power distribution unit (PDU).
11	Signal Distribution Unit Control C-1169/GRC-206	812081-801	Signal distribution unit (SDU).

Table 2-1. Equipment Supplied-continued

Item no.	Nomenclature/ common name	Part number/ FSN/NSN	Contents/ remarks
12	HF antenna insulator	348657-1	Antenna insulator boot.
13	Antenna AT-1011	5985-00-069-6243	HF (WHIP) antenna; GFE.
14	Antenna AS-1729( )/VRC	5985-00-985-9024	VHF/FM antenna; GFE.
15	Electrical Equipment Mounting Base MT-6250/GRC-206	812084-801	Equipment mounting rack with COMSEC equipment mounts and cabling; used with Radio Communication System AN/GRC-206(V)1 only. Rack weighs approximately 145 pounds (65.8 kg); two person lift required.
	Electrical Equipment Mounting Base MT-6250A/GRC-206	812084-802	Equipment mounting rack less COMSEC equipment mounts and cabling; used with Radio Communication System AN/GRC-206(V)2 only. Rack weighs approximately 130 pounds (59 kg); two person lift required.
	Electrical Equipment Mounting Base MT-6250B/GRC-206	812084-803	Equipment mounting rack with RFO mount, COMSEC equipment mounts and cabling; used with Radio Communication System AN/GRC-206(V)3 only. Rack weighs approximately 145 pounds (65.8 kg); two person lift required.
16	Fiber optic cable assembly (W11)	566081-801	Remote (3281 ft) fiber optic cable and cable reel assembly; two supplied. Each fiber optic cable assembly weighs approximately 61 pounds (27.7 kg); two person lift required.
17	Input power cable (W2)	566073-802	50 ft input power cable.

Table 2-1. Equipment Supplied-continued

Item no.	Nomenclature/ common name	Part number/ FSN/NSN	Contents/ remarks
18	Radio Set AN/VRC-83(V)1	707123-802	VHF/UHF-AM radio set used in Radio Communication System AN/GRC-206(V)1 and AN/GRC-206(V)2; two supplied.
	Radio Set AN/VRC-83(V)2	707123-804	VHF/UHF-AM radio set with ECCM capability. Used in Radio Communication System AN/GRC-206(V)3 only; two supplied.
19	Input power cable (W1)	566073-801	12 ft input power cable.
20	Adapter MX-9313/GR	626500-2	HF antenna to antenna base adapter.
21	VIC-1 Audio cable assembly (W12)	566084-807	VIC-1 audio cable assembly.
	Local fiber optic cable assembly (W10)	566080-801	Local (50 ft) fiber optic cable assembly.
	Local fiber optic cable assembly (W9)	566080-802	Local (20 ft) fiber optic cable assembly.
	FM Antenna control cable assembly (W8)	566083-806	FM antenna control cable assembly.
	VHF/FM Antenna cable assembly (W7)	566078-801	VHF/FM antenna cable assembly.
22	VHF/UHF Antenna cable assembly (W6)	566077-802	VHF antenna cable assembly.
	VHF/UHF Antenna cable assembly (W5)	566077-801	UHF antenna cable assembly.
	HF Antenna cable assembly (W4)	566076-801	HF antenna cable assembly.
	RSC Power cable assembly (W3)	566085-807	RSC power cable; two supplied.
23	Cleaning kit	741889-801	Cleaning kit used to perform fiber optic link maintenance.

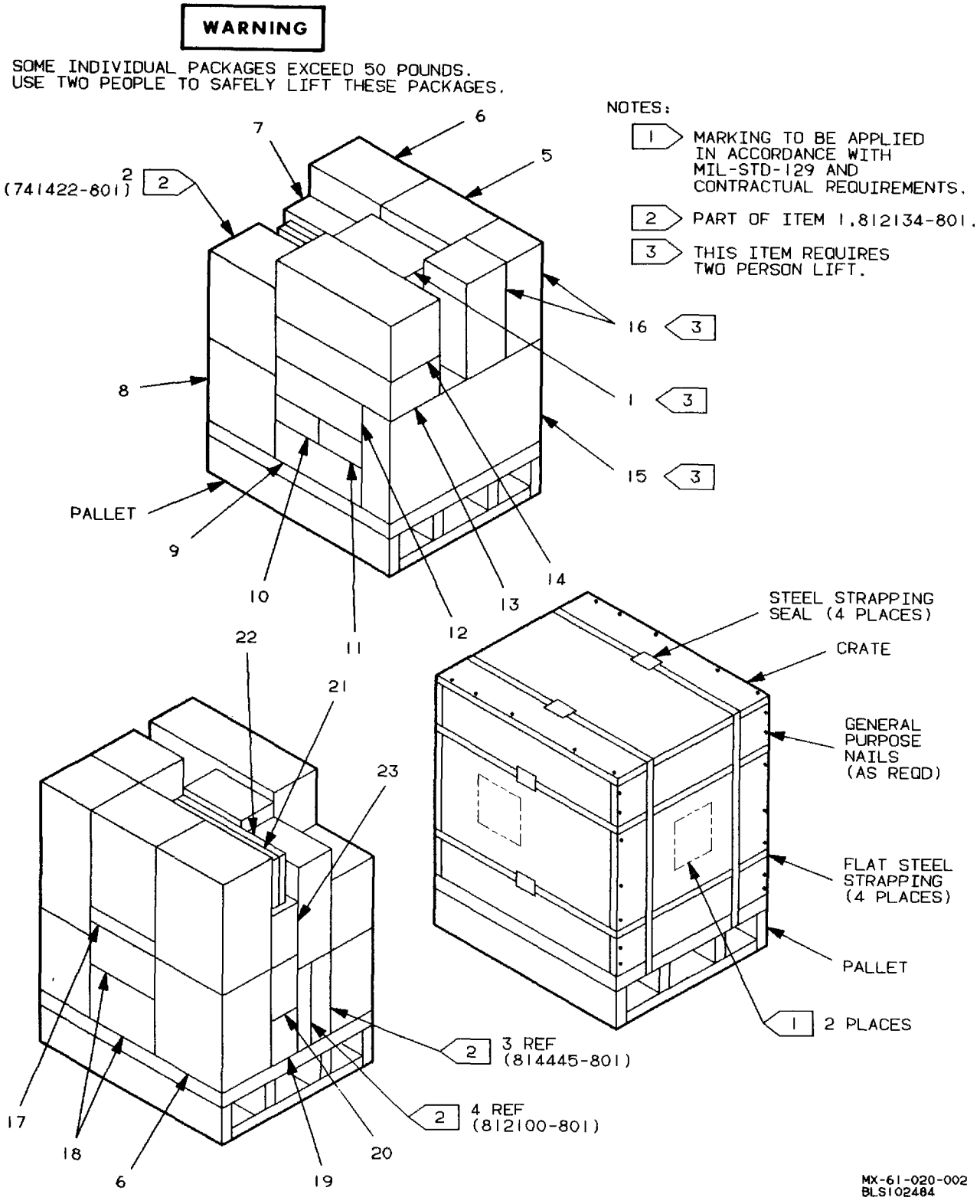


Figure 2-1. Radio System Packaging and Pack Assembly Diagram

Table 2-2. Interconnecting Cables

Reference designation	Description	Function
W1	Input Power Cable (12 ft)	Provides primary power connection between the vehicle power source and power switchboard SB-4151/GRC-206.
W2	Input Power Cable (50 ft)	Provides primary power connection between an auxiliary motor generator and the power switchboard.
W3	RSC Power Cable (two supplied)	Provides dc power connection between the SDU and RSCs during local operation of the Radio System.
W4	HF Antenna Cable	Provides rf path between HF Radio Set and the HF antenna.
W5	VHF/UHF Antenna Cable (UHF)	Provides rf path between UHF-AM Radio Set and the UHF port of the VHF/UHF antenna.
W6	VHF/UHF Antenna Cable (VHF)	Provides rf path between VHF-AM Radio Set and the VHF port of the VHF/UHF antenna.
W7	VHF-FM Antenna Cable	Provides rf path between VHF BITE panel and the VHF-FM antenna.
W8	FM Antenna Control Cable	Provides control connection between the VHF-FM Radio and the VHF-FM antenna matching unit.
W9	Local Fiber Optic (F/O) Cable (20 ft)	Provides audio and control connection between the SDU and the local RSC.
W10	Local Fiber Optic (F/O) Cable (50 ft)	Provides audio and control connection between the SDU and the remote RSC.
W11	Remote (3281 ft) Fiber Optic Cable (two supplied)	Provides audio and control connection between the SDU and the remote RSC.
W12	VIC-1 Audio Cable	Provides audio connection between the SDU and the intercommunication equipment (AM-1780/VRC or C-2298/VRC) in the M-113 vehicle.
4W1	Power Distribution Cable	Distributes input power to HF Radio Set.

Table 2-2. Interconnecting Cables-Continued

Reference designation	Description	Function
4W2	Power Distribution Cable	Distributes input power to KY-65 and Z-AKH COMSEC equipment. Used with Radio Communication System AN/GRC-206(V)1 only.
4W3	Power Distribution Cable (two supplied)	Distributes input power to VHF-AM radio and UHF-AM Radio Sets.
4W4	Power Distribution Cable	Distributes input power to SDU.
4W5	Power Distribution Cable (three supplied)	Distributes input power to KY-57 and HYP-57 COMSEC equipment. Used with Radio Communication System AN/GRC-206(V)1 only.
4W6	Power Distribution Cable	Distributes input power to VHF-FM mount, MT-1029/URC.
4W9	SDU Control Cable	Interconnects control signals between SDU and HF Radio Set.
4W10	SDU Audio Cable	Interconnects audio signals between RT-1444 and KY-65 COMSEC equipment during secure voice operation of the HF radio set. Used on Radio Communication System AN/GRC-206(V)1 only.
4W11	SDU Audio Cable	Interconnects audio signals between RT-1444 and SDU during nonsecure voice operation of the HF Radio Set. Interconnects audio signals between KY-65 COMSEC equipment and SDU during secure voice operation of the HF Radio Set in Radio Communication System AN/GRC-206(V)1.
4W12	SDU Audio Cable (two supplied)	Interconnects audio signals between SDU and the VHF-AM and UHF-AM Radio Set during nonsecure voice operation. Interconnects audio signals between KY-57 COMSEC equipment and SDU during secure voice operation of the VHF-AM and UHF-AM Radio Set in Radio Communication System AN/GRC-206(V)1.
4W13	SDU Control Cable (two supplied)	Interconnects control signals between the SDU and the VHF-AM, and UHF-AM Radio Set.

Table 2-2. Interconnecting Cables-Continued

Reference designation	Description	Function
4W14	SDU Audio Cable (two supplied)	Interconnects audio signals between KY-57 COMSEC equipment and the VHF-AM and UHF-AM Radio Set during secure voice operation. Used on Radio System AN/GRC-206(V)1 only.
4W15	SDU Control Cable	Interconnects control signals between the VHF-FM Radio, VHF BITE panel, and the SDU.
4W16	VHF-FM Antenna Cable	Interconnects rf signals between the VHF BITE panel and the VHF-FM Radio.
4W17	SDU Audio Cable	Interconnects audio signals between SDU and VHF-FM Radio during nonsecure voice operation. Interconnects audio signals between the KY-57 COMSEC equipment and the SDU during secure voice operation of the VHF-FM Radio in Radio System AN/GRC-206(V)1.
4W18	SDU Control Cable	Interconnects control/audio signals between the VHF BITE panel and KY-57 COMSEC equipment during secure voice operation of the VHF-FM Radio in Radio System AN/GRC-206(V)1.
4W19	SDU Control Cable	Interconnects control/audio signals between the VHF BITE panel and the VHF-FM Radio during nonsecure voice operation. Interconnects control/audio signals between the VHF BITE panel and the VHF-FM Radio during secure voice operation of the VHF-FM Radio in Radio System AN/GRC-206(V)1.

Section II. INSTALLATION PROCEDURES

2-8. GENERAL. This section contains information and instructions for installing the Radio System into either of two vehicles: the M-151 1/4 ton utility vehicle and M-416 1/4 ton cargo trailer; or the M-113-A1/A2 armored personnel carrier (APC). Included are details for the erection of antennas, along with procedures for changing equipment configurations for different types of operation.

2-9. PREPARATION AND INSTALLATION PROCEDURES FOR THE M-151 VEHICLE. The following paragraphs provides the procedures necessary to prepare the M-151 vehicle for Radio System installation. Refer to table 1-6 for equipment required.

a. Preparation of the M-151 Vehicle. The preparation procedures provided in this paragraph applies to M-151 vehicles which have Power Generating System MK-486/MRC installed. If the MK-486/MRC is not installed in the vehicle, refer to Modification Work Order MWO 9-2320-218-30/3 and Technical Bulletin TB 9-2320-218-34/2 prior to performing the preparation procedures in this paragraph. When performing the vehicle preparation procedures, observe all safety precautions associated with the use of power and/or hand tools. Refer to figure FO-1 and perform the following procedures to prepare the M-151 vehicle for Radio System installation.

NOTE

Check vehicle for corrosion. Backplate may be required.

(1) Remove all cargo from vehicle.

(2) Remove rear seat and associated holddown pins, if installed.

(3) Remove front seats and reinstall holddown pins.

WARNING

Battery ground connection should be removed first.

(4) Remove battery cover and disconnect battery cables.

(5) Locate, drill and deburr sixteen (16) holes in top rear sponsons in accordance with detail (A) .

(6) Position two backup plates and install eight insert nuts in accordance with detail (A) .

(7) Locate, drill and deburr six holes in rear curbside sponson in accordance with detail (B) .

(8) Install four insert nuts in accordance with detail (B) .

(9) Locate, drill and deburr three holes in rear roadside sponson in accordance with detail (C) .

(10) Install three insert nuts in accordance with detail (C) .

(11) Locate, drill and deburr twenty-three (23) holes in rear of vehicle in accordance with detail (D) .

(12) Install twenty (20) insert nuts in accordance with detail (D) .

CAUTION

Do not damage cable located inside lip of vehicle dash panel.

(13) Locate, drill and deburr six holes in vehicle dash panel in accordance with view A-A, detail (E) .

(14) Install six insert nuts in accordance with view A-A, detail (E) .

(15) Install five grommets into existing holes as shown in detail (A) .

b. Installation of Radio System into M-151 Vehicle. These procedures apply to M-151 vehicles which have been modified for Radio System installation. In addition, the canvas top and spare tire must be removed from the vehicle prior to performing these procedures. Refer to figure FO-2 and the following procedures to accomplish installation of the Radio System.

(1) Installation of Vehicle Input Power Cable W1. Refer to figure FO-2, detail (A) and proceed as follows:

(a) Remove front passenger seat, and reinstall holddown pins.

WARNING

Battery ground connection should be removed first.

(b) Remove battery cover and disconnect battery cables.

WARNING

Possible loss or spillage of engine oil.

(c) Locate and remove existing (original) pipe plug on oil filter base. Clean and dry threads of oil filter base where pipe plug was removed.

(d) Clean and dry threads of pressure switch, pipe adaptor, pipe nipple and pipe plug.

(e) Coat exposed threads of pipe adaptor, pipe nipple and pipe plug with sealant per TT-S-1732.

(f) Install and tighten pipe plug into pressure switch.

(g) Assemble and tighten pipe nipple, pipe adaptor and pressure switch, respectively, onto oil filter base where original pipe plug was removed.

NOTE

Check engine oil level. Add engine oil as required.

(h) Route and connect sensor wire (white wire with in-line connector) and ground wire of cable W1 as follows:

1 Disconnect in-line connector on sensor wire of cable W1.

2 From inside engine compartment, connect sensor connector P2 of cable W1 to pressure switch connector. Connect ground wire (short white wire) of sensor connector P2 to vehicle ground in accordance with detail (A) .

3 Route sensor wire (long white wire) from sensor connector P2, along original cable run and through grommet in footboard. Secure sensor wire along original cable run with adjustable cable straps.

(i) Position and route cable W1 along curbside of vehicle as shown in detail (A) .

(j) Route white wire (with in-line connector) of cable W1 as shown in detail (A) . Locate routed white wire (sensor wire) from engine compartment and reconnect in-line connector.

(k) Route red, black and green wires of cable W1 through grommets near curbside passenger area as shown in detail (A) .

WARNING

Battery ground connection should be connected last.

(l) Connect positive (+) battery cable and red wire of cable W1 to positive (+) battery terminal as shown in detail (A) .

(m) Connect negative (-) battery cable and two remaining wires (black, green) of cable W1 to negative (-) battery terminal as shown in detail (A) .

(n) Replace battery cover.

(o) After installation of equipment mounting rack and all LRUs, replace front seats.

(2) Installation of Equipment Mounting Rack. To install the equipment mounting rack refer to figure FO-2 and proceed as follows:

WARNING

The equipment mounting rack weighs 145 lbs (65.8 kg). Two person lift required.

(a) Lift and position equipment mounting rack into rear of vehicle as shown in detail (C) .

(b) Position two rack mounts, two spacers, and ground strap as shown in detail (A) . Install eight bolts and attaching hardware in accordance with detail (A) . Do not tighten bolts securely at this time.

(c) Align holes in rack mount, equipment mounting rack and ground strap, install and tighten four bolts and attaching hardware in accordance with details (C) and (E) .

(d) Tighten eight bolts previously installed in rack mounts, detail (A).

(3) Installation of Radio Set Control Mounts. To install two radio set control (RSC) mounts, refer to figure FO-2 and proceed as follows:

(a) Position RSC mount on dash; install and tighten six bolts and attaching hardware in accordance with view A-A, detail (B).

(b) Position RSC mounting bracket on curbside of equipment mounting rack; then install four bolts and attaching hardware in accordance with detail (C).

(c) Position RSC mount into RSC mounting bracket and secure with four flat head screws as shown in detail (C).

(4) Installation of Antenna Mounts. To install the VHF-FM, HF, and VHF/UHF antenna mounts, refer to figure FO-2 and proceed as follows:

(a) Position VHF-FM antenna mount on left rear corner of vehicle as shown in detail (D).

(b) Install and tighten seven bolts and attaching hardware as shown in details (D) and (E).

(c) Position HF antenna mount on rear of vehicle as shown in detail (D).

(d) Install and tighten twelve (12) bolts and attaching hardware as shown in detail (D).

(e) Install HF cable tube through opening in the HF antenna mount and secure with two spring clamps as shown in section B-B, detail (A).

(f) Route HF cable tube through two loop clamps on rear of equipment mounting rack as shown in detail (D).

(g) Position VHF/UHF antenna mount on right rear corner of vehicle as shown in detail (D).

(h) Install and tighten eight bolts and attaching hardware as shown in details (C) and (D).

(5) Installation of Mobile Antennas. To install the VHF-FM, HF (WHIP), and UHF/VHF antenna, refer to figure FO-3 and proceed as follows:

NOTE

Prior to installing the antennas, wipe the unpainted and threaded areas thoroughly to remove all moisture, dust, oils or other contaminating materials.

(a) Position VHF-FM antenna (AS-1729/VRC) base assembly on top of VHF-FM antenna mount as shown in detail (B).

(b) Align holes in antenna base and mount; install and tighten four bolts and attaching hardware in accordance with detail (A).

(c) Place butt of antenna mast over antenna base assembly; hand-tighten in a clockwise direction until mast can no longer be turned by hand.

(d) Position HF antenna base assembly on top of HF antenna mount as shown in detail (B)

(e) Align holes in antenna base and mount; install and tighten three bolts and attaching hardware in accordance with detail (A) . Install and tighten bolt, lock washer and angle washer into remaining hole in antenna base.

(f) Place butt (bottom four foot antenna section) of antenna mast over antenna base assembly; hand-tighten in a clockwise direction until mast can no longer be turned by hand.

(g) Place HF antenna insulator over mounted antenna section; pull insulator down until it completely covers antenna base as shown in detail (B) .

NOTE

The HF (WHIP) antenna consists of eight (8) four-foot sections. Sixteen (16) feet (four sections) is the maximum length for mobile operation. Guy wire assembly (PN 815425-801) must be used to support all antenna lengths greater than sixteen feet.

(h) Assemble remaining antenna sections as required to meet operating mode: sixteen feet (four sections) for mobile or stationary operations; twenty-four feet (six sections) or thirty-two feet (eight sections) for stationary operation only. Stow unused antenna sections as shown in detail (A) .

(i) Position VHF/UHF antenna on top of VHF/UHF antenna mount as shown in detail (B) .

(j) Align holes in antenna base and mount; install and tighten captive screw assembly as shown in detail (B) .

(6) Installation of HF (NVIS) Antenna. The NVIS antenna is used with the HF radio to increase the range above the distance that is normally possible with the HF WHIP antenna during stationary operation. The NVIS antenna should be located in the center of a clear area. Installation should not be near any tall metal object or under heavy foliage. To install the NVIS antenna, refer to figure FO-3 and proceed as follows:

WARNING

Avoid contact with the HF antenna during transmit operation. Death or injury could occur.

CAUTION

Do not install antenna where it may come in contact with a structure or material which will cause the RF signal to be shorted to ground. Damage to the radio may occur.

(a) Open antenna pack AS-2259/GR (NSN: 5985-106-6130) and remove antenna to antenna base adapter MX-9313/GR (MX-9313).

NOTE

Prior to installing the NVIS antenna wipe the unpainted and threaded areas thoroughly to remove all moisture, dust, oils or other contaminating materials.

(b) Remove existing ground wire from adapter MX-9313 and install NVIS ground strap assembly (PN 567611-801) using original hardware from adapter MX-9313, see detail (C) .

(c) Install adapter MX-9313 on HF antenna base assembly; tighten by hand in a clockwise direction until it can no longer be turned by hand.

(d) Attach NVIS ground strap assembly from the MX-9313 to the angle washer of the HF antenna base assembly using attaching hardware; see detail (C).

NOTE

When attaching the ground cable to the angle washer, do not remove the attaching hardware (nut) from the ground cable.

(e) Complete installation of NVIS antenna in accordance with the instructions contained inside the antenna pack. Prior to completing the installation instructions, install the HF antenna insulator as shown in detail (B) .

(7) Installation of Radio Set Controls. To install the radio set controls in the M-151 vehicle, refer to figure FO-2 and proceed as follows:

(a) Position RSC in dashboard RSC mounting bracket as shown in details (A) and (C) .

(b) Secure RSC to RSC mounting bracket with four quick-release latches located on sides of mounting bracket. The dash mounted RSC is referenced as RSC-1 and is used for local control of the Radio System.

(c) Position RSC in RSC mounting bracket on curbside of equipment mounting rack as shown in detail (C) .

(d) Secure RSC to RSC mounting bracket with four quick-release latches located on sides of mounting bracket. The RSC installed on the equipment mounting rack is referenced as RSC-2 and will be used for remote deployment.

(8) Cable Routing and Connections. Refer to figures FO-2, FO-3 and FO-5. To route or stow Radio System cable assemblies, proceed as follows:

(a) Install thirteen (13) loop clamps and attaching hardware as shown in figure FO-2, detail (A) , (C) and (D) .

(b) Route HF antenna cable (W4) through HF antenna cable tube as shown in figure FO-3.

(c) Secure all multi-cable runs with adjustable cable straps.

(d) Refer to figure FO-7 for Radio System interconnecting cable and equipment diagram.

2-10. INSTALLATION OF RADIO SYSTEM COMPONENTS. Install components of the Radio System into the equipment mounting rack in accordance with the following paragraphs. The component installation procedures are general and apply to Radio System equipment configured within the M-113 or M-151 vehicles. The installation procedures should be accomplished with all power reset circuit breakers in the OFF position. Refer to figure FO-7 for Radio System cable connection diagrams.

a. Installation of HF Radio Set. The HF radio set consists of two major components; Receiver-Transmitter RT-1444/URC (modified RT-1209/URC) and Amplifier-Coupler AM-7148/GRC-206 (AM-7148). Prior to installing the HF radio set, RT-1209/URC (RT-1209) must be modified with modification kit 812130-801. To install the HF radio set, perform the following installation and/or modification procedures as necessary.

(1) Modification of RT-1209. Modification kit 812130-801 is a housing extension kit installed in RT-1209. The housing extension kit is installed between the housing and the control panel. To install modification kit 812130-801 in RT-1209, refer to figure 2-2 and proceed as follows:

CAUTION

Do not position RT-1209 so that the control panel will fall out when it is removed. Damage to the flex cable could result.

(a) Position RT-1209 on a flat surface so that control panel assembly is facing up.

(b) Remove and discard six screws and flatwashers that secure control panel to housing assembly.

NOTE

C-rings under gasket captivate front panel screws.

CAUTION

When the control panel is removed, care should be taken to prevent static discharge.

(c) Lift control panel from housing assembly by pulling upward on AUDIO connectors.

CAUTION

When disconnecting the connectors, pull straight outward or damage to the connector pins could result.

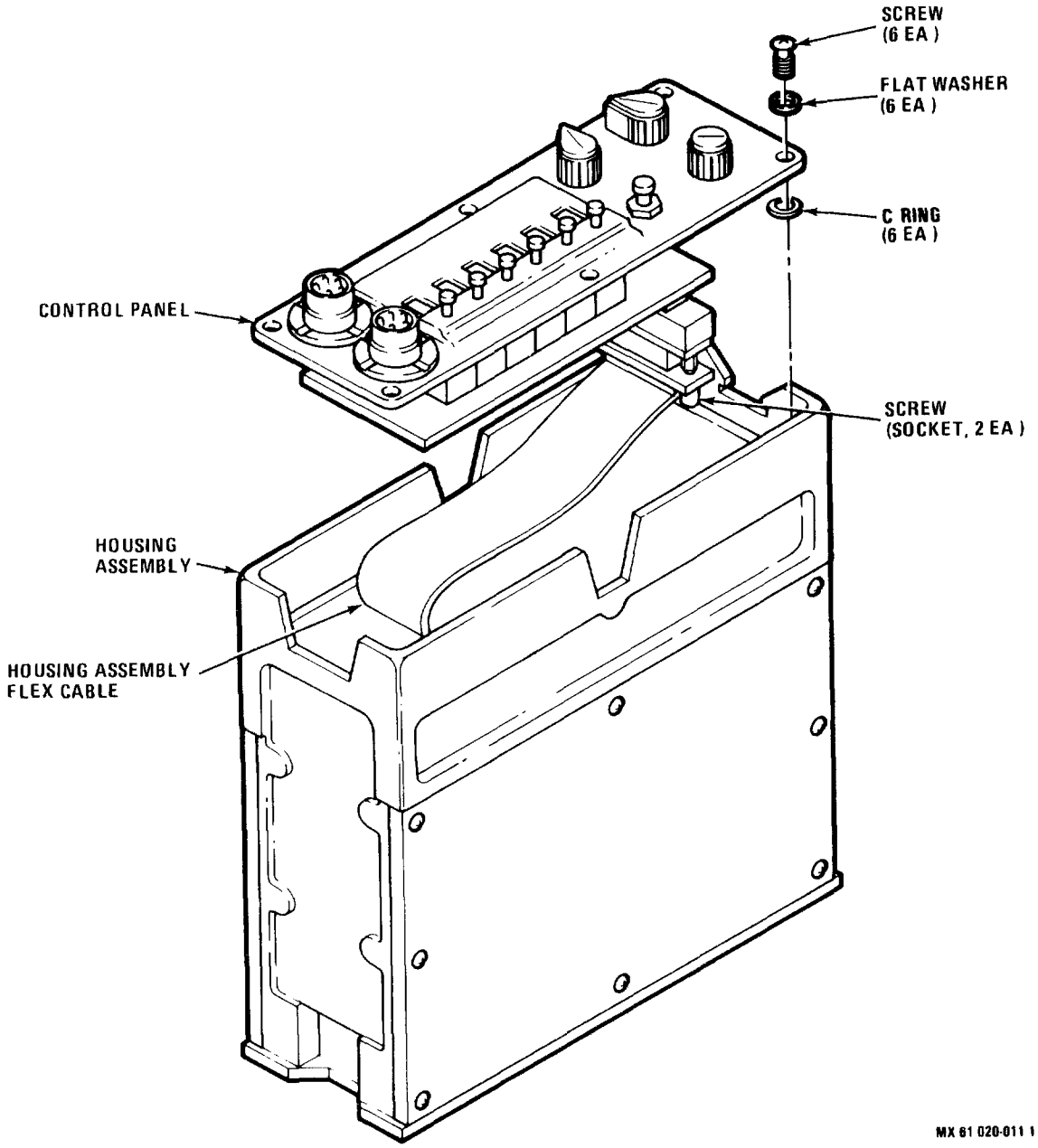


Figure 2-2. RT-1209 Modification Diagram (Sheet 1 of 2)

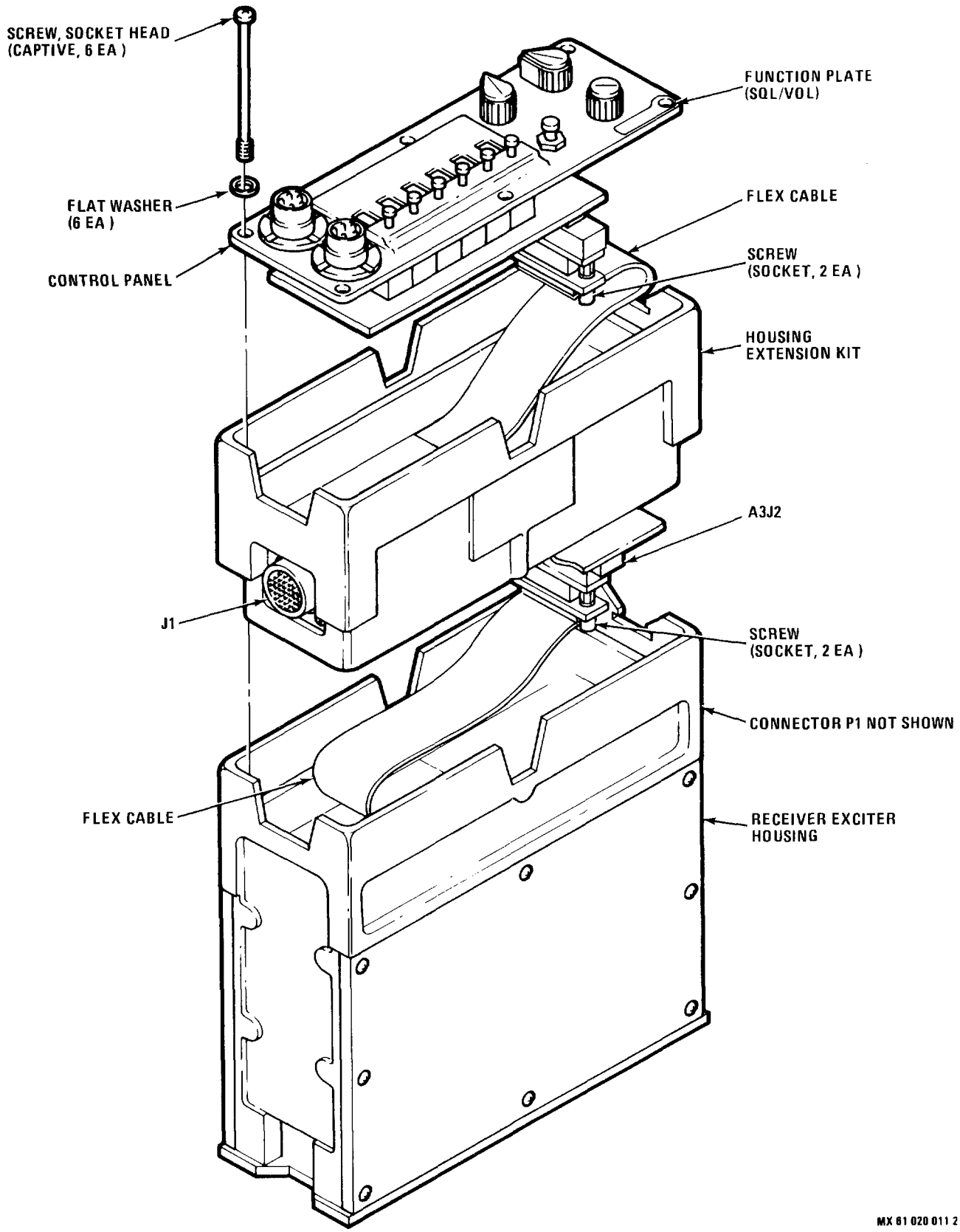


Figure 2-2. RT-1209 Modification Diagram (Sheet 2 of 2)

(d) Loosen two socket head screws and disconnect flex cable from connector on control panel.

CAUTION

When mating connectors, push straight in or damage to the connector pins could result.

(e) Connect receiver-exciter housing flex cable connector to connector A3J2 on bottom of housing extension kit. Alternately tighten two socket head screws.

(f) Position housing extension kit into receiver-exciter housing so that connector J1 is positioned as shown in figure 2-2. Note that connector J1 is on the opposite side from receiver-exciter housing connector P1.

(g) Connect flex cable connector of housing extension kit to control panel connector A1A4P1. Alternately tighten two socket head screws.

(h) Position control panel on top of housing extension kit.

(i) Install and alternately tighten six socket head screws and flat washers; SQL/VOL function plate should be installed on lower right corner of control panel.

(2) Installation of HF Radio Set. To install the HF radio set, refer to figure 2-3 and proceed as follows:

(a) Position RT-1444 so that top portion of left handle on AM-7148 is aligned with center V-cut in RT-1444 front panel. Lower and slide RT-1444 right until a firm connection is made with connector on AM-7148.

(b) Position and tighten front and left-side latches to secure RT-1444 in place.

(c) Connect audio cable 3W1(P1) to bottom AUDIO connector on RT-1444 and connector 3W1(P2) to AUDIO connector on AM-7148.

(d) Close pressure equalizer valve on AM-7148 rear panel.

(e) Insert HF radio set into mounting tray and secure with two thumbscrew fasteners.

(f) Connect ground lead from equipment mounting rack to ground terminal on rear panel of AM-7148 and secure with wing nut.

(g) Connect cable W4 (antenna feed wire) to ANTENNA connector on AM-7148 rear panel. Position and secure rubber boot (insulator) over antenna connector.

NOTE

Cable W4 should be routed from the HF antenna mount to the AM-7148 through the HF cable tube installed on the rear of the equipment mounting rack.

(h) Connect power cable 4W1(P1) to AM-7148 rear panel connector J6.

(i) Refer to cabling diagram figure FO-7, and make cable connections to meet Radio System configuration requirements.

b. Installation of Power Switchboard. To install the power switchboard, refer to figure 2-3 and proceed as follows:

(1) Position power switchboard into SDU-power switchboard mount and secure with two thumbscrew fasteners.

(2) Remove connector cover and connect power cable W1(P1) to connector J4 (if vehicle power will be used), or connect W2(P1) to connector J5 (if auxiliary motor generator power will be used).

c. Installation of SDU. To install the SDU, refer to figure 2-3 and proceed as follows:

(1) Position SDU into SDU-power switchboard mount and secure with two thumbscrew fasteners.

(2) Refer to cabling diagram, figure FO-7, and make cable connections to meet Radio System configuration requirements. To aid in making cable connections, refer to table 2-3 which lists the suggested SDU cabling sequence.

NOTE

The VHF/AM and UHF/AM control cables (4W13P1 and 4W13P1) should be flexed a number of times before initial installation.

Table 2-3. SDU Cabling Sequence

	Cable Ref. Des.	Cable type	SDU connector
1)	4W15P1	VHF/FM control	J11
2)	4W13P1	VHF/AM control	J12
3)	4W13P1	UHF/AM control	J13
4)	4W4P1	SDU power	J14
5)	4W9P1	HF/SSB control	J10
6)	W3P1	RSC power	J8 (RSC1)
7)	W10P1 or W9P1	F/O audio and control	J1 (RSC1)
8)	W3P1	RSC power	J9 (RSC2)
9)	W10P1 or W9P1	F/O audio and control	J2 (RSC2)
10)	4W12P1	VHF/AM audio	J6
11)	4W12P1	UHF/AM audio	J7
12)	4W11P1	HF/SSB audio	J5
13)	4W17P1	VHF/FM audio	J3
14)	W12P1	VIC-1 audio	J4 (M-113 vehicle only)

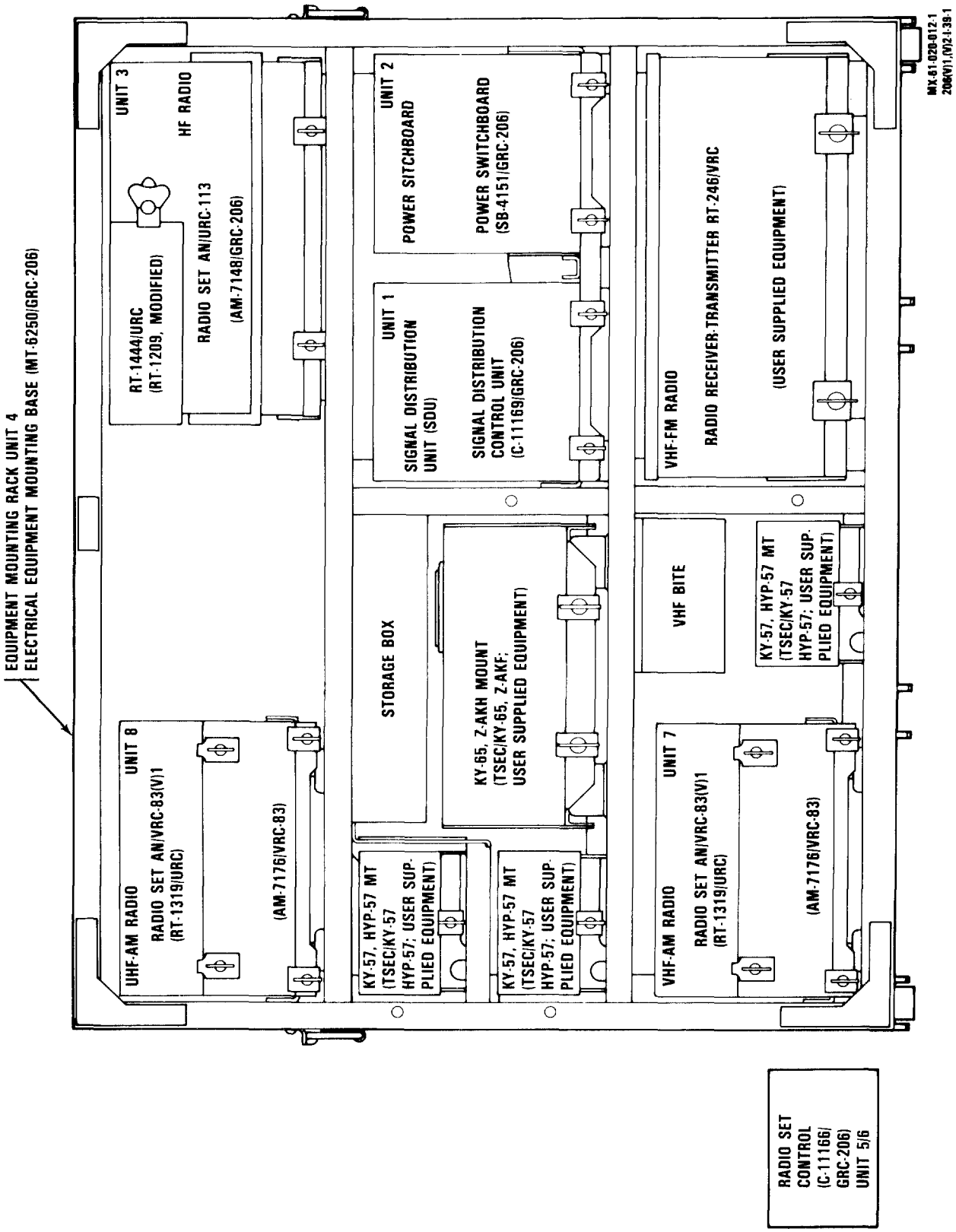


Figure 2-3. Radio System Component Location Diagram (Sheet 1 of 2)

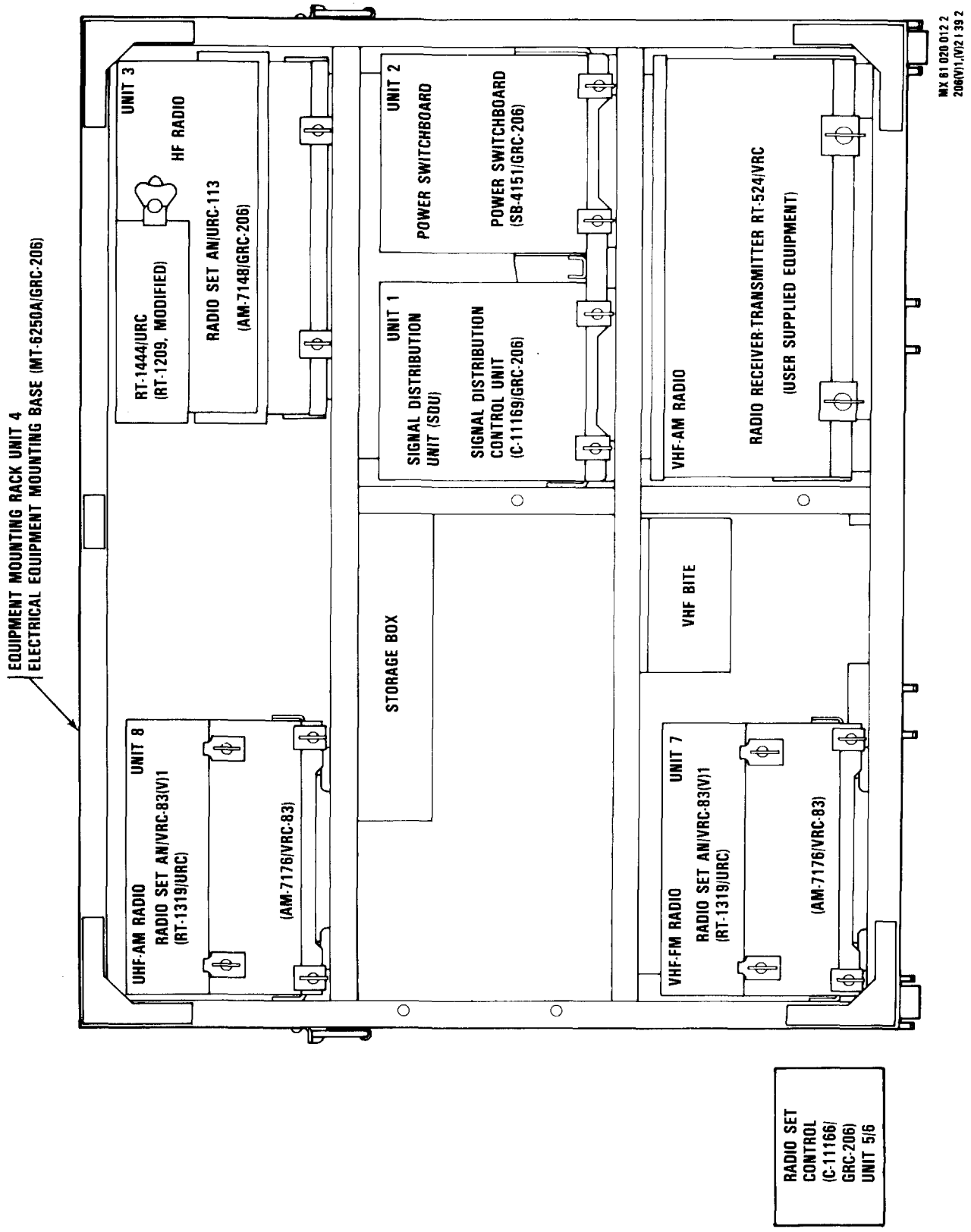


Figure 2-3. Radio System Component Location Diagram (Sheet 2 of 2)

d. Installation of VHF-FM Radio. To install the VHF-FM radio, refer to figure 2-3 and proceed as follows:

WARNING

The VHF-FM radio weighs approximately 60 lbs (27.2 kg). Two person lift required.

(1) Position VHF-FM radio so that power connector on rear panel will mate with power plug mounted at rear of mounting tray.

(2) Push VHF-FM radio into mounting tray until it makes good contact with power plug.

(3) Secure radio to mount with two thumbscrew fasteners.

(4) Refer to cabling diagram figure FO-7, and make cable connections to meet Radio System configuration requirements.

e. Installation of VHF/UHF-AM Radio Set. Radio Set AN/VRC-83(V)1 is used as the VHF-AM radio set and the UHF-AM radio set for the Radio System. To install Radio Set AN/VRC-83(V)1 into each of the two equipment mounting rack locations, refer to figure 2-3 and proceed as follows:

(1) On rear panel, remove connector cover from connector J3 and connect power cable 4W3(P1).

(2) Position radio set into mounting tray and secure with two thumbscrew fasteners.

(3) Refer to cabling diagram figure FO-7, and make cable connections to meet Radio System configuration requirements.

f. Installation of COMSEC Equipment. The installation procedures for COMSEC equipment applies to Radio System AN/GRC-206(V)1 only. The procedures necessary to install COMSEC equipment into the equipment mounting rack is provided in the following subparagraphs.

(1) Installation of KY-57 and HYP-57 COMSEC Equipment. The KY-57 and HYP-57 is used with the VHF-FM radio and the VHF/UHF-AM radio sets during secure voice operation. To install the COMSEC equipment into either one of three locations within the equipment mounting rack, refer to figure 2-3 and proceed as follows.

(a) On HYP-57 rear panel, remove connector cover from J2 and connect cable 4W5(P1).

(b) Position assembled COMSEC equipment into mounting location; secure equipment to mount with thumbscrew fastener.

(c) Refer to cabling diagram figure FO-7 for required cable connections.

(2) Installation of KY-65 and Z-AKF COMSEC Equipment. The KY-65 and Z-AKF is used with the HF radio set during secure voice operation. To install the COMSEC equipment into the equipment mounting rack, refer to figure 2-3 and proceed as follows:

(a) Connect power cable 4W2(P1) to connector J1 on Z-AKF rear panel.

(b) Position assembled COMSEC equipment into its equipment mounting rack location; secure equipment to mount with thumbscrew fastener.

(c) Refer to cabling diagram figure FO-7 for required cable connections.

2-11. PREPARATION AND INSTALLATION PROCEDURES FOR THE M-416 TRAILER. The following paragraphs provides the procedures necessary to prepare the M-416 trailer for Radio System equipment installation. Refer to table 1-6 for equipment required.

a. Preparation of the M-416 Trailer. When performing the vehicle preparation procedures, observe all safety precautions associated with the use of power and/or hand tools. To prepare the M-416 trailer for Radio System equipment installation, refer to figure FO-4 and proceed as follows:

NOTE

Check vehicle for corrosion. Backplate may be required.

(1) Remove all cargo from trailer.

(2) Locate, drill and deburr twenty (20) holes inside trailer bed in accordance with detail (A) .

(3) Install eight lock washers and insert nuts in accordance with detail (A).

(4) Install six strap fastener loops and attaching hardware in accordance with detail (A) .

(5) Locate, drill and deburr twelve (12) holes in accordance with detail (B).

(6) Install two strap fastener loops and attaching hardware in accordance with detail (B) .

(7) Install two fuel tank bracket assemblies and attaching hardware in accordance with detail (B) .

(8) Locate, drill and deburr eight holes in accordance with detail (C) .

(9) Install four strap fastener loops and attaching hardware in accordance with detail (C) .

b. Installation of Radio System Equipment into M-416 Trailer. To install Radio System equipment into the M-416 trailer, refer to figure FO-5 and the following procedures.

(1) Installation of Auxiliary Motor Generator, Reeling Machine, and Electrical Equipment Rack. To install auxiliary motor generator, reeling machine and electrical equipment rack, refer to figure FO-5 and proceed as follows:

(a) Position generator mounting rail (item 1) inside trailer as shown in detail (A) .

(b) Install and tighten two bolts and attaching hardware into mounting rail in accordance with detail (A) .

NOTE

Procedures to install the electrical equipment rack applies to Radio Communication System AN/GRC-206(V)1 only. When these procedures are used to install Radio Communication System AN/GRC-206(V)2, all references to the electrical equipment rack should be disregarded.

(c) Position generator mounting rail (item 3) and electrical equipment rack inside trailer as shown in detail (A) .

(d) Install and tighten two bolts and attaching hardware into electrical equipment rack and generator mounting rail in accordance with detail (A) .

WARNING

The auxiliary motor generator weighs 121 lbs (54.89 kg). Two person lift required.

(e) Lift and position auxiliary motor generator onto generator mounting rails; secure generator to mounting rails with four spring locking pins.

(f) Secure electrical equipment rack to motor generator's top frame rail with two retaining straps as shown in detail (A) .

(g) With reeling machine collapsed (legs closed) and all movable parts secured in place; position and align reeling machine on auxiliary motor generator top frame rail.

(h) Secure reeling machine to auxiliary motor generator top frame rail with four retaining straps as shown in detail (A).

(2) Installation of Reel Rack and Fiber Optic Cable Assemblies. To install the reel rack and fiber optic (F/O) cable assemblies, refer to figure FO-5 and proceed as follows:

(a) Position reel rack into trailer as shown in detail (A).

(b) Install and tighten four bolts and attaching hardware in accordance with detail (A) .

WARNING

One fiber optic cable and reel assembly weighs 61 lbs (27.7 kg). Two person lift required.

(c) Position two F/O cables and reel assemblies onto reel rack as shown in detail (A) , and secure with four retaining straps attached to reel rack.

(3) Installation of Auxiliary Fuel Tanks. To install the auxiliary fuel tanks, refer to figure FO-5. Position auxiliary fuel tanks in fuel tank mounting brackets and secure with retaining straps as shown in detail (B).

(4) Installation of Field Packs and Accessory Bags. To install the field packs and accessory bags, refer to figure FO-5. Position field pack and accessory bags shown in detail (A) ; secure with retaining straps.

(5) Stowage of Input Power Cable (W2). To stow the auxiliary input power cable refer to figure FO-5. Position the auxiliary input power cable as shown in detail (A) ; secure with two retaining straps.

2-12. PREPARATION AND INSTALLATION PROCEDURES FOR THE M-113-A1/A2 VEHICLE. The following paragraphs provide the procedures necessary to prepare the M-113-A1/A2 APC for Radio System equipment installation.

a. Preparation of the M-113 Vehicle. When performing the vehicle preparation procedures, observe all safety precautions associated with the use of hand tools. To prepare the M-113 vehicle for Radio System equipment installation, refer to figure FO-6 and proceed as follows:

NOTE

Use adjustable (reuseable) cable straps to secure all cables routed in accordance with these procedures.

(1) Remove and stow rear section of seat and all backrest from curbside of vehicle as shown in detail (B) .

(2) Remove rear interior door from engine compartment.

(3) Locate fuel filters shown in detail (A) . Perform steps (a) through (d) if the Radio System is being installed in the M-113A1 vehicle; perform steps (e) through (h) if installation is being accomplished in the M-113A2 vehicle.

WARNING

The APC fuel system is pressurized, possible loss or spillage of diesel fuel.

(a) Locate and remove existing pressure switch from fuel filter shown in detail (A) ; retain existing pressure switch. Clean and dry threads of existing pressure switch and fuel filter where pressure switch was removed.

(b) Clean, dry and coat threads of pipe nipple and pipe tee with sealant per TT-S-1732. Install and tighten pipe nipple and pipe tee into fuel filter where pressure switch was removed; see detail (A) .

(c) Clean and dry threads of pipe plug and pressure switch to be installed. Coat threads of pipe plug with sealant per TT-S-1732, then install and tighten pipe plug into pressure switch.

(d) Screw and tighten pressure switch and existing pressure switch onto pipe tee as shown in detail (A) . Proceed to step (4).

WARNING

The APC fuel system is pressurized, possible loss or spillage of diesel fuel.

(e) Locate and remove existing pipe plug from fuel filter shown in detail (A); retain and stow pipe plug. Clean and dry threads of fuel filter where pipe plug was removed.

(f) Clean, dry and coat threads of pipe elbow with sealant per TT-S-1732; install and tighten pipe elbow onto fuel filter where pipe plug was removed.

(g) Clean and dry threads of pipe plug and pressure switch to be installed. Coat threads of pipe plug with sealant, then install and tighten pipe plug into pressure switch.

(h) Screw and tighten pressure switch onto pipe elbow in accordance with detail (A) .

NOTE

On cable W1, disconnect/reconnect in-line connector of sensor wire (long white wire) as necessary to accomplish cable routing and connections.

(4) Connect P2 of cable W1 to pressure switch as shown in detail (A) .

(5) Connect ground wire (short wire) from connector P2 to existing pipe hanger; route sensor wire (long white wire) of W1 as shown in details (A) and (E) .

(6) Replace and secure rear interior engine cover.

WARNING

Battery ground connection should be removed first.

(7) Connect red wire of cable W1 to positive (+) battery terminal; and green, and black wires to vehicle ground lug in accordance with detail (E) .

(8) Assemble RSC mounting bracket, hanger bracket, and knee brace in accordance with details (A) and (C) . Use item 5 with M-113A2 vehicles; use item 51 with M-113A1 vehicles.

(9) Remove two hatch bolts and one pipe clamp bolt; position assembled RSC mount and reinstall three bolts and two flat washers in accordance with details (A) and (C) .

(10) Assemble RSC mounting bracket and hanger bracket in accordance with details (A) and (F) .

(11) Remove existing hardware from shelf support (underneath shelf) where assembled RSC mount will be installed.

(12) Position assembled RSC mount under shelf; secure mount to shelf with two bolts and attaching hardware in accordance with detail (E) . Align holes in hanger bracket and shelf support; reinstall shelf support hardware.

b. Installation of Radio System Equipment into the M-113 Vehicle. To install Radio System equipment into M-113 vehicle, refer to figure FO-6 and the following procedures.

NOTE

Use adjustable (reuseable) cable straps to secure all cables routed in accordance with these procedures.

(1) Installation of RSCs. To install the RSCs, refer to figure FO-6 and proceed as follows:

(a) Place one RSC into mount located near forward bulkhead area and secure with four quick-release latches as shown in detail (C) .

(b) Place one RSC into RSC mount located on roadside bulkhead and secure with four quick-release latches as shown in detail (F) .

NOTE

Do not complete cable routing, until equipment mounting rack is installed.

(c) Connect fiber optic cable W9 and RSC power cable W3 to RSC located on roadside bulkhead. Route cables along existing cable run and as shown in details (A) ,(B) ,(E) and (F) .

(d) Connect fiber optic cable W10 and RSC power cable W3 to RSC located near forward bulkhead area. Route cables as shown in details (A) , (C) and (E) .

(2) Installation of Mobile Antennas. To install the VHF-FM, HF (WHIP), and VHF/UHF antenna, refer to figure FO-6 and proceed as follows:

(a) Remove existing weather plates and attaching hardware from three unused antenna ports. Retain and stow weather plates and hardware.

NOTE

Prior to installing antennas, wipe the unpainted and threaded areas thoroughly to remove all moisture, dust, oils or other contaminating materials.

(b) Position VHF/UHF antenna in front curbside port and secure with captive hardware as shown in detail (B) .

(c) Position HF antenna base in rear curbside port; install and tighten three bolts and attaching hardware in accordance with detail (B) . Install and tighten bolt, lock washer and angle washer as shown in detail (B) .

(d) Place butt (bottom four foot antenna section) of antenna mast over HF antenna base; hand-tighten in a clockwise direction until mast can no longer be turned by hand.

(e) Place HF antenna insulator over mounted antenna section; pull insulator down until it covers antenna base as shown in detail (B) .

NOTE

The HF (WHIP) antenna consist of eight four-foot sections. Sixteen feet (four sections) is the maximum length for mobile operation. Guy wire assembly (PN 815425-801) must be used to support all antenna lengths greater than sixteen feet.

(f) Assemble remaining antenna sections as required to meet operating mode: sixteen feet (four sections) for mobile or stationary operations; twenty-four feet (six sections) or thirty-two feet (eight sections) for stationary operation only. Stow unused antenna sections as shown in detail (E).

(g) Position VHF-FM antenna (AS-1729/VRC) base assembly in front roadside port; install and tighten four bolts and attaching hardware in accordance with detail (F) .

NOTE

If the existing antenna (AN/VRC-46) is mounted in the front roadside port, the VHF-FM antenna should be mounted in the rear roadside port.

(h) Place butt of antenna mast over antenna base assembly and hand-tighten in a clockwise direction until mast can no longer be turned by hand.

(3) Installation of Equipment Mounting Rack. To install the equipment mounting rack, refer to figure FO-6 and proceed as follows:

WARNING

The equipment mounting rack weighs 145 lbs (65.8 kg). Two person lift required.

(a) Lift and position equipment mounting rack on curbside sponson so that mounting holes in bottom shelf of equipment mounting rack align with existing holes in curbside sponson.

CAUTION

Ground strap still connects VHF-FM upper and lower trays together.

(b) Remove five bolts and attaching hardware from VHF-FM radio mounting tray and retain hardware; disconnect cable 4W6P1 from mounting tray and remove mounting tray. Refer to figure 2-3 for component location.

(c) Install four rack mounting bolts and attaching hardware in accordance with detail (A) ; do not tighten bolts securely.

(d) Position two rack mounts (one each side of equipment mounting rack); install two bolts and attaching hardware in accordance with detail (E), into two bottom holes of each mount. Do not tighten bolts securely.

(e) Align top hole in rack mount with hole in existing tabs on vehicle ceiling (see detail (A)); install bolts and attaching hardware in accordance with detail (E).

NOTE

Additional spacers (flat washers) may be required between the rack mount and existing tabs on vehicle ceiling; shim as required.

(f) Tighten all bolts securing equipment mounting rack to vehicle.

(g) Replace VHF-FM radio mounting tray and reconnect cable 4W6(P1) to connector J21; reinstall and tighten four bolts and attaching hardware.

(h) Install fiber optic cable mounting strap as shown in detail (E). Complete routing of cables W3, W9, and W10 from roadside and forward bulkhead mounted RSCs in accordance with details (A) through (F).

(i) Connect cables W7(P1), and W8(P2) to VHF-FM antenna port connectors J1 and J2, respectively; route cables in accordance with details (F), (A), and (B).

(j) Connect cable W12(P2) to existing C-2298/VRC or AM-1780/VRC; route cable in accordance with details (A) and (B).

(k) Connect cables W5(P2), and W6(P2) to VHF/UHF-AM antenna ports UHF and VHF, respectively; route cables in accordance with detail (B).

(l) Connect cable W4 (PN 566076-802) to HF antenna port; route cable in accordance with detail (B). Install rubber boot (insulator) over HF antenna and base assembly.

(m) Install Radio System components into equipment mounting rack; refer to paragraph 2-10 for component installation procedures.

(4) Installation of Field Packs and Accessory Bags. Install and secure field packs and accessory bags in accordance with figure FO-6, details (B), (E) and (F). Secure field packs to vehicle with retaining straps.

(5) Installation of Auxiliary Motor Generator, Reeling Machine, and Electrical Equipment Rack. To install the auxiliary motor generator, reeling machine and electrical equipment rack, refer to figure FO-6 and proceed as follows:

(a) Remove four existing bolts and hardware from vehicle floor where auxiliary motor generator will be installed, see details (A) and (B). Retain and stow bolts and hardware.

(b) Position generator mounting rail (item 34) inside vehicle, as shown in detail (A). Install and tighten two bolts and attaching hardware into generator mounting rail in accordance with detail (A).

NOTE

Procedures to install the electrical equipment rack applies to Radio Communication System AN/GRC-206(V)1 only. When these procedures are used to install Radio Communication System AN/GRC-206(V)2, all references to the electrical equipment rack should be disregarded.

(c) Position generator mounting rail (item 36) and electrical equipment rack inside vehicle as shown in detail (A) . Install and tighten two bolts and attaching hardware into electrical equipment rack and generator mounting rail in accordance with detail (A) .

WARNING

The auxiliary motor generator weighs 121 lbs (54.89 kg). Two person lift required.

(d) Lift and position auxiliary motor generator onto mounting rails; secure generator to mounting rails with four spring locking pins.

(e) Secure electrical equipment rack to auxiliary motor generator top frame with two retaining straps as shown in detail (A) .

(f) Lift and position reel rack on auxiliary motor generator top frame rails as shown in detail (B) .

(g) Install four J-hook assemblies on reel rack as shown in details (A) and (B) . Loosen adjustment knobs on J-hook assemblies and position clamp rods under auxiliary motor generator's top frame rails; tighten adjustment knobs on J-hook assemblies.

WARNING

One fiber optic cable and reel assembly weighs 61 lbs (27.7 kg). Two person lift required.

(h) Position two F/O cables and reel assemblies on reel rack as shown in detail (B) , and secure with four retaining straps attached to reel rack.

(i) With reeling machine collapsed and all movable parts secured in place; position and align reeling machine with auxiliary motor generator frame rail as shown in details (A) and (B) .

(j) Secure reeling machine to auxiliary motor generator frame rail with four retaining straps as shown in detail (B) .

(k) Secure auxiliary input power cable (W2) to auxiliary motor generator frame rail with two retaining straps as shown in detail (B) .

(6) Installation of Auxiliary Fuel Tanks. Position auxiliary fuel tanks on rear of vehicle shown in details (A) and (B) . Secure fuel tanks to vehicle with retaining straps.

2-13. REMOVAL OF RADIO SYSTEM EQUIPMENT FROM VEHICLE. The following paragraphs provide instructions necessary to remove the Radio System from the M-151 or M-113 vehicle. Accomplish removal of the Radio System in as orderly a manner as possible. Note all mounting hardware and attaching parts. Note all existing hardware that must be reinstalled after equipment removal. Retain and stow all Radio System equipment hardware including adjustable cable straps.

a. Removal of Radio System Equipment from M-151 Vehicle and M-416 Trailer. The following procedures describe how to remove the Radio System equipment from the M-151 vehicle and M-416 trailer. Refer to figures FO-2, FO-3 and FO-5.

(1) Remove canvas top from M-151 vehicle, if installed.

(2) Remove spare tire from vehicle.

(3) Insure power is off to Radio System; remove all cables connected to front panels of rack mounted components. Do not remove radio set cables such as 3W1.

(4) Remove RSC mounted on curbside of equipment mounting rack. If the Radio System is being transferred to a M-113 vehicle, also remove RSC mount. Retain and stow attaching hardware.

(5) Remove stowed antennas located behind equipment rack.

(6) Remove and stow HF and VHF-FM antenna elements in their canvas cases. Set aside HF antenna insulator.

(7) Loosen adjustable cable straps and disconnect antenna cables from three antenna bases. Remove antenna cables from vehicle.

NOTE

If the Radio System will be installed in another M-151 vehicle, the antenna bases and VHF/UHF antenna may remain on the antenna mounts.

(8) Loosen captive screw assembly on VHF/UHF antenna base. Remove VHF/UHF antenna.

(9) Remove VHF/UHF antenna mount, retain and stow attaching hardware.

(10) Remove HF, and VHF-FM antenna bases from antenna mounts. Retain and stow attaching hardware.

(11) Remove HF, and VHF-FM antenna mounts from vehicle. Retain and stow attaching hardware.

(12) Disconnect cables to dash mounted RSC. Remove RSC and cables.

(13) Remove RSC mount from dash, retain and stow attaching hardware.

(14) Position front passenger seat to gain access to battery compartment. Remove seat if necessary.

WARNING

Battery ground connection should be removed first and replaced last.

(15) Remove battery cover and remove the three leads of cable W1 from battery terminals. Reconnect battery terminals; replace battery cover and front passenger seat.

(16) Disconnect sensor plug P2 and ground wire of cable W1 at engine compartment.

WARNING

Possible loss or spillage of engine oil.

(17) Disconnect in-line connector of cable W1. Carefully pull white wire of W1 through grommet in footboard; reconnect in-line connector and remove cable W1 from vehicle.

(18) Remove pressure switch from oil filter base. Clean, dry and coat original pipe plug with sealant per TT-S-1732. Install and tighten original pipe plug into oil filter base where pressure switch was removed.

NOTE

Check engine oil level. Add engine oil as required.

NOTE

If these removal procedures are being performed to transfer the Radio Communication System to another vehicle, the SDU and power switchboard may remain installed in the equipment mounting rack.

(19) Disconnect cables connected to rear of Radio System components. Remove all Radio System components from equipment mounting rack by loosening thumbscrew fasteners on each component mount. Pull component from mounting tray. Refer to the component removal procedures contained in chapter 5, as necessary.

(20) Remove rack mounts from each side of equipment mounting rack. Retain and stow attaching hardware and ground strap.

WARNING

The equipment mounting rack weighs 145 lbs (65.8 kg). Two person lift required.

(21) Lift and remove equipment mounting rack from rear of vehicle.

(22) Verify all Radio System equipment is removed from M-151 vehicle. Replace or stow spare tire and canvas top.

(23) Remove accessory bags, field packs and retaining straps from the M-416 trailer.

(24) Remove attaching hardware securing reel rack to trailer. Retain and stow attaching hardware.

WARNING

The assembled fiber optic (F/O) cables (1 km, each), reel assemblies and reel rack weighs 130 lbs (59 kg). Two person lift required.

(25) Lift and remove F/O cables, reel assemblies and reel rack from trailer.

(26) Loosen four retaining straps and remove reeling machine from trailer; retain and stow retaining straps.

(27) Remove stowed auxiliary input power cable (W2); retain and stow retaining straps.

WARNING

The auxiliary motor generator weighs 121 lbs (54.89 kg). Two person lift required.

(28) Remove retaining straps on electrical equipment rack and release spring locking pins securing motor generator to generator mounting rails. Lift and remove auxiliary motor generator from the trailer.

(29) Remove generator mounting rails and electrical equipment rack from trailer. Retain and stow attaching hardware.

(30) Remove auxiliary fuel tanks from rear of trailer. Retain and stow retaining straps.

(31) Verify all Radio System equipment and attaching hardware is removed from the M-416 trailer.

b. Removal of Radio System Equipment from M-113 Vehicle. The following procedures describe how to remove the Radio System equipment from the M-113 vehicle. Refer to figure FO-6.

(1) Remove accessory bags, field packs, stowed antennas, reeling machine and associated retaining straps from M-113 vehicle; retain and stow retaining straps.

WARNING

The assembled fiber optic (F/O) cables (1 km, each), reel assemblies and reel rack weighs 130 lbs (59 kg). Two person lift required.

(2) Remove four J-hook assemblies from reel rack; retain and stow J-hook assemblies. Lift and remove F/O cables, reel assemblies and reel rack from vehicle.

(3) Remove and stow retaining straps securing electrical equipment rack and auxiliary input power cable (W2) to generator frame rail. Remove and stow auxiliary input power cable.

WARNING

The auxiliary motor generator weighs 121 lbs (54.89 kg). Two person lift required.

(4) Release spring locking pins securing auxiliary motor generator to generator mounting rails. Lift and remove auxiliary motor generator from vehicle.

(5) Remove generator mounting rails and electrical equipment rack from vehicle. Retain and stow attaching hardware. Replace original bolts in floor.

(6) Remove auxiliary fuel tanks and retaining straps from rear of vehicle. Retain and stow retaining straps.

(7) Insure power is off to Radio System; remove all cables connected to front panel of rack mounted components. Do not remove radio set cables, such as 3W1.

(8) Disconnect cables from radio set controls. Remove and retain adjustable cable straps; remove cables.

(9) Remove radio set controls, mounting brackets and braces; retain and stow attaching hardware. Reinstall original bolts and attaching hardware.

WARNING

Battery ground connection should be removed first and replaced last.

(10) Remove battery cover; disconnect red wire of cable W1 connected to positive battery terminal. Remove ground cable and wires of cable W1 connected to vehicle ground lug. Reconnect battery terminals and replace battery cover.

(11) Remove rear interior engine door and set aside.

(12) Disconnect sensor plug and ground wire of cable W1 at engine compartment.

(13) Locate fuel filters shown in detail (A) and perform the following steps. Perform steps (a) through (e) if the Radio System is being removed from the M-113A1 vehicle; perform steps (f) through (i) if removal involves the M-113A2 vehicle.

WARNING

The APC fuel system is pressurized, possible loss or spillage of diesel fuel.

(a) Locate and remove pressure switch and existing pressure switch from pipe tee shown in detail (A) .

(b) Locate and remove pipe nipple and pipe tee from fuel filter shown in detail (A) .

(c) Clean and dry threads of original pressure switch and threads of fuel filter where pipe nipple was removed.

(d) Coat threads of fuel filter with sealant per TT-S-1732; install and tighten original pipe plug onto fuel filter where pipe nipple was removed.

(e) Clean and dry threads of pressure switch, pipe nipple and pipe tee; retain and stow pressure switch, pipe nipple and pipe tee. Proceed to step (14).

WARNING

The APC fuel system is pressurized, possible loss or spillage of diesel fuel.

(f) Locate and remove pressure switch and pipe elbow from fuel filter shown in detail (A) .

(g) Clean and dry threads of pressure switch, pipe elbow and threads of fuel filter where pipe elbow was removed. Retain and stow pressure switch and pipe elbow.

(h) Clean, dry and coat threads of original pipe plug with sealant per TT-S-1732.

(i) Install and tighten original pipe plug onto fuel filter where pipe elbow was removed.

(14) Remove adjustable cable straps and wires of W1 from rear interior engine compartment. Replace and secure rear interior engine door.

NOTE

If these removal procedures are being performed to transfer the Radio System to another vehicle, the SDU and power switchboard may remain installed in the equipment mounting rack.

(15) Disconnect cables connected to rear of Radio System components. Remove all Radio System components from equipment mounting rack by loosening thumbscrew fasteners on each component mount. Pull component from mounting tray.

(16) Disconnect cables from HF, VHF-FM and VHF/UHF antenna bases. Remove and retain adjustable cable straps; remove antenna cables.

(17) Disconnect cable W12 from existing AM-1780/VRC or C-2298/VRC; remove cable and adjustable cable straps.

CAUTION

When mounting bolts are removed from VHF-FM mount, a ground strap still connects the upper and lower trays together.

(18) Remove VHF-FM radio set mount from bottom shelf of equipment mounting rack. Retain attaching hardware.

(19) Remove four bolts securing equipment mounting rack to curbside sponson. Remove rack mounts from top of equipment mounting rack; retain and stow mounts and attaching hardware.

(20) Disconnect ground cable between equipment mounting rack and vehicle; retain and stow ground cable and attaching parts.

WARNING

The equipment mounting rack weighs 145 lbs (65.8 kg). Two person lift required.

(21) Verify equipment mounting rack is free of cable connections and attaching hardware that could oppose its removal. Lift and remove equipment mounting rack from vehicle.

NOTE

If the equipment mounting rack is to be installed into another M-113 vehicle, do not reinstall the VHF-FM radio set mount at this time.

(22) Reinstall VHF-FM radio set mount into equipment mounting rack with attaching hardware retained during removal.

(23) Remove and stow HF, and VHF-FM antenna elements in their canvas cases. Set aside HF antenna insulator.

(24) Remove HF, and VHF-FM antenna bases from vehicle. Retain and stow attaching hardware.

(25) Secure VHF-FM and HF antenna ports with original weather plates and attaching hardware.

(26) Remove VHF/UHF antenna from vehicle. Secure antenna port with original weather plate and attaching hardware.

(27) Verify that all Radio System equipment is removed from M-113 vehicle and that original equipment has been reinstalled or stowed in vehicle.

CHAPTER 3

PREPARATION FOR USE AND RESHIPMENT

3-1. INTRODUCTION. This chapter contains information and instructions covering the preparation for use and reshipment of the Radio System. This chapter is divided into two sections: Section I, Preparation for Use; and Section II, Preparation for Reshipment.

Section I. PREPARATION FOR USE

3-2. GENERAL. This section contains information on preparing the Radio Communication System AN/GRC-206(V)1 for use. Information presented in this section also applies the Radio Communication System AN/GRC-206(V)2, except the capability for secure voice operation.

3-3. SYSTEM OPERATION. Refer to chapter 4, section I for the description and location of controls, indicators and connectors required for Radio System operation. Radio Communication System AN/GRC-206(V)1 is capable of secure or nonsecure voice operation with either one or all of its RF subsystems. Both Radio Systems recognizes the following states or configurations of operation.

a. Local Operation. Two configurations of local operation are recognized by the Radio System. The configurations are normal operation via the RSC/SDU interface and the emergency mode which bypasses the RSC/SDU interface.

(1) Normal mode. The normal mode of operation is via the RSC/SDU interface with one or both RSC's controlling the Radio System. This configuration permits the use of either local (20 or 50 feet) F/O cable as the communication link between the RSC and SDU. When the local 50 feet (17 m) F/O cable is used, the associated RSC must be powered by its internal batteries.

(2) Emergency mode. In the emergency mode, audio and control cables routed from the SDU are removed from either or all RF subsystems, thus bypassing the RSC/SDU interface. The emergency mode configuration allows the RF subsystem to be operated via its front panel controls.

b. Remote Operation. Remote operation of the Radio System is identical to local normal operation, except remote F/O cables are used as the data link between the RSC and SDU. Electrically, one or both RSC's may be remoted up to 9,843 feet (3 km). However, only enough optical fiber is supplied to remote one RSC up to 6,562 feet (2 km). When the RSC is remotely deployed, batteries are used as the power source.

3-4. SYSTEM TEST. Test the Radio System to insure proper operation prior to deployment. Test the Radio System in accordance with the performance test checks contained in chapter 5, section III or the appropriate work card set (TO 31R2-2GRC 206-6WC-1). The test configuration should include all F/O cable assemblies necessary to meet mission requirements. If the mission requires use of an additional 1 km F/O cable assembly (user supplied), this cable assembly should also be used during predeployment testing. The cable assembly should be installed and tested

between the two 1 km F/O cable assemblies supplied with the Radio System. The user supplied cable assembly must be included in the test to insure operational capability and proper connector mating when deployed. During test, if the Radio System fails to meet the required indications due to the use of the user supplied cable, substitute another user supplied cable assembly for the one used in the test.

Section II. PREPARATION FOR RESHIPMENT

3-5. GENERAL. This section contains instructions for preparing the Radio System for reshipment. Instructions are also provided for preparing the Radio System for deployment as part of the vehicle in which it is installed. The information presented in this section does not cover procedures for preparing the M-151 or M-113 vehicle for reshipment or deployment. Refer to TO 31Z3-181-22 and related publications for this information.

3-6. PREPARATION FOR RESHIPMENT OR DEPLOYMENT. The following paragraphs contain the information and instructions necessary to prepare the Radio System for reshipment or deployment.

a. Methods and Conditions of Reshipment. If shipment of the Radio System is required, normal packing and shipping precautions should be observed. Carefully pack the equipment in the original shipping containers, if available. Brace the equipment in the same manner that the equipment was originally shipped. Refer to figures 3-1 through 3-4 for typical packing and unpacking procedures.

b. Disassembly Required for Reshipment. The disassembly procedures necessary for shipment of the Radio System are provided in the following subparagraphs.

(1) Disassembly Required to Ship the Radio System. To disassemble the Radio System for shipment as an end item, refer to the Radio System removal procedures in chapter 2.

(2) Disassembly Required to Ship Radio System Components or Assemblies. For removal and disassembly procedures necessary to ship components/assemblies, refer to chapter 5.

(3) Disassembly Required to Ship Radio System Equipment Intact on Vehicle. To disassemble the Radio System for shipment or deployment as part of the vehicle, proceed as follows:

(a) Turn off all power.

(b) Remove batteries from both radio set controls. For battery removal/replacement procedures refer to the RSC maintenance procedures in chapter 5.

(c) Remove handsets and store in equipment mounting rack storage box.

(d) Open pressure equalizer valve located on rear panel of AM-7148.

(e) Remove HF, VHF-FM, and UHF/VHF antennas from mounts and stow in appropriate canvas transit bags. Retain and stow attaching hardware. Stow HF antenna insulator in accessory bag.

(f) Stow or secure all loose or dangling cables.

(g) Cap all electrical connectors with attached screw-on or snap-on connector covers. If covers are not provided, place a piece of plastic over connector and secure with rubberband.

(h) Carefully check each clamp, fastener, tiedown and connector on equipment mounting rack and on each piece of equipment to determine that all are securely tightened. Pay particular attention to equipment mounting rack tiedowns.

(i) Check that all stowed equipment and accessories are securely held in place.

(j) In addition to the above procedures, refer to TO 31Z3-181-22.

c. Use of Reuseable Containers. If at all possible, Radio System components should be shipped in their original containers. Refer to the Radio System pack list which lists the original shipping containers and packed contents. Refer to figure 3-1 for component packing procedures, and figure 3-2 for assembly packing procedures. Equipment mounts or brackets which only require physical or mechanical protection should be packed in accordance with figure 3-3. Refer to figure 3-4 for antenna and cable packing procedures.

d. Items Requiring Special Attention. Several components of the Radio System contain assemblies which require special handling. These assemblies contain devices which are sensitive to electrostatic discharge (ESD). Refer to table 3-1 which lists these components and their associated assemblies. Control measures contained in TO 00-25-234 should be observed during all handling or maintenance of these assemblies.

Table 3-1. Items Requiring Special Attention

Unit/component	Assembly	
	Name	Ref. Des.
Unit 1, Signal Distribution Unit Control C-11169/GRC-206	Audio Interface No. 1 CCA (PN 812094-801)	A1
	Audio Interface No. 2 CCA (PN 812095-801)	A2
	Red Interface CCA (PN 812154-801)	A3
	Black Interface CCA (PN 812117-801)	A4
	CPU CCA (PN 812116-801)	A5
	Fiber Optic Module (PN 812099-801)	A8/A9
Unit 3, Radio Set AN/URC-113		
Amplifier-Coupler AM-7148/GRC-206 A1	Lower Electrical Equipment Chassis (PN 651-8446-001)	A1
	Power Amplifier Assembly (PN 659-5855-001)	A1A1
	Antenna Tuner Assembly (PN 642-1859-001)	A2
	Control Logic Assembly (PN 651-8463-001)	A4
	Upper Electrical Equipment Chassis (PN 651-8445-001)	A5
	Display Card (PN 64605809-001)	A5A1
	Audio Amplifier (PN 646-5619-001)	A5A3
	Power Conditioner (PN 646-5831-001)	A5A4

Table 3-1. Items Requiring Special Attention-Continued

Unit/component	Assembly	
	Name	Ref. Des.
Receiver-Transmitter RT-1444/URC A2	Control Panel Module (PN 755002A0440)	A1A4
	Remote Control Module (PN 812130-801)	A1
Unit 4, Electrical Equipment Mounting Base MT-6250/GRC-206	FM BITE/Audio Interface (PN 812132-801)	A1
Unit 5/6, Radio Set Control C-11166/GRC-206	(See note)	
RSC Case Assembly (PN 812092-801)	Fiber Optic Module (PN 812099-801 or -802)	A1A4
RSC Panel Assembly (PN 812120-801)	Digital Interface CCA (PN 812126-801)	A2A1
	Audio Interface CCA (PN 812133-801)	A2A2

NOTE: Remove batteries from the RSC prior to shipment or storage for more than 30 days.

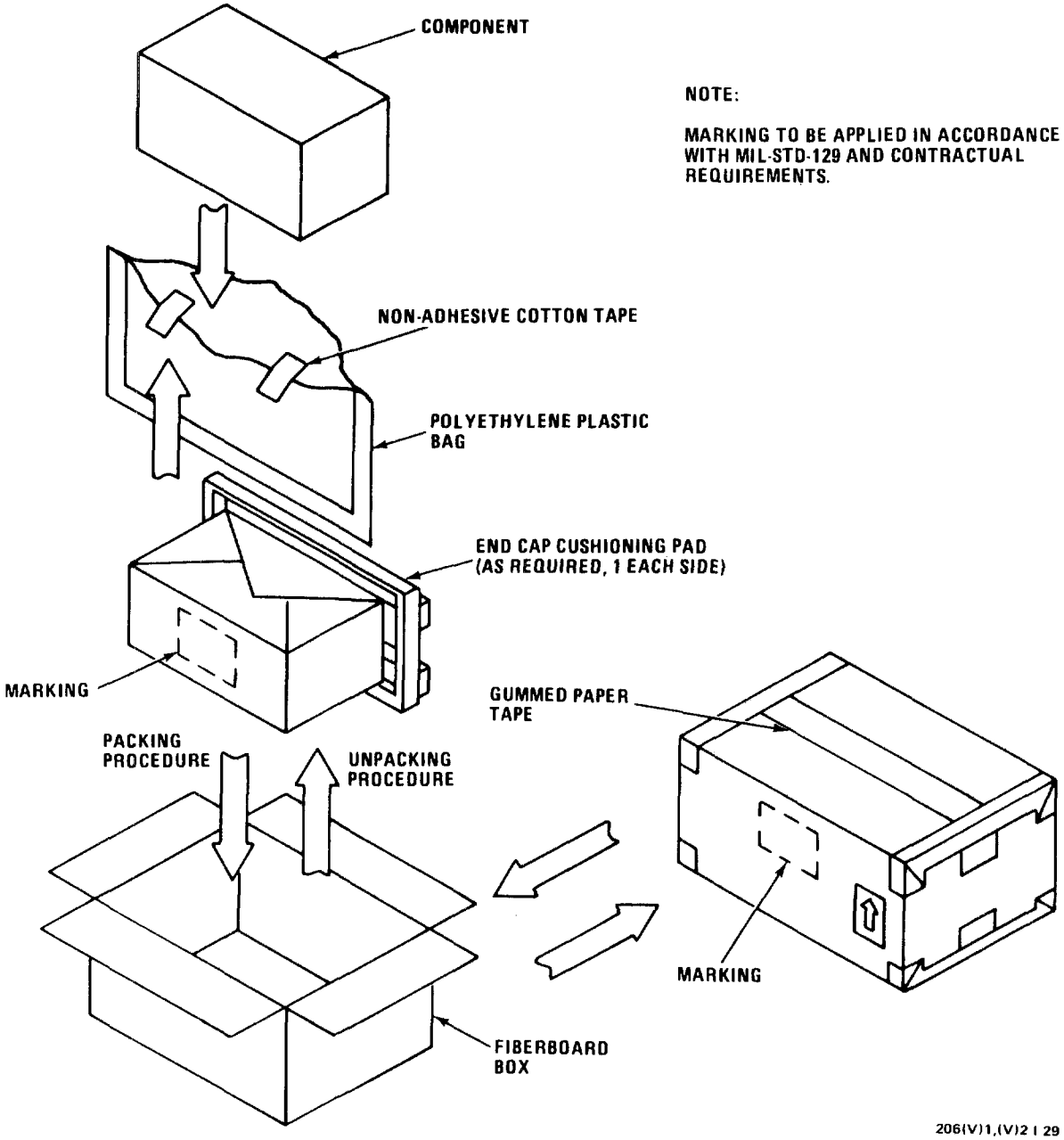


Figure 3-1. Component Packing and Unpacking

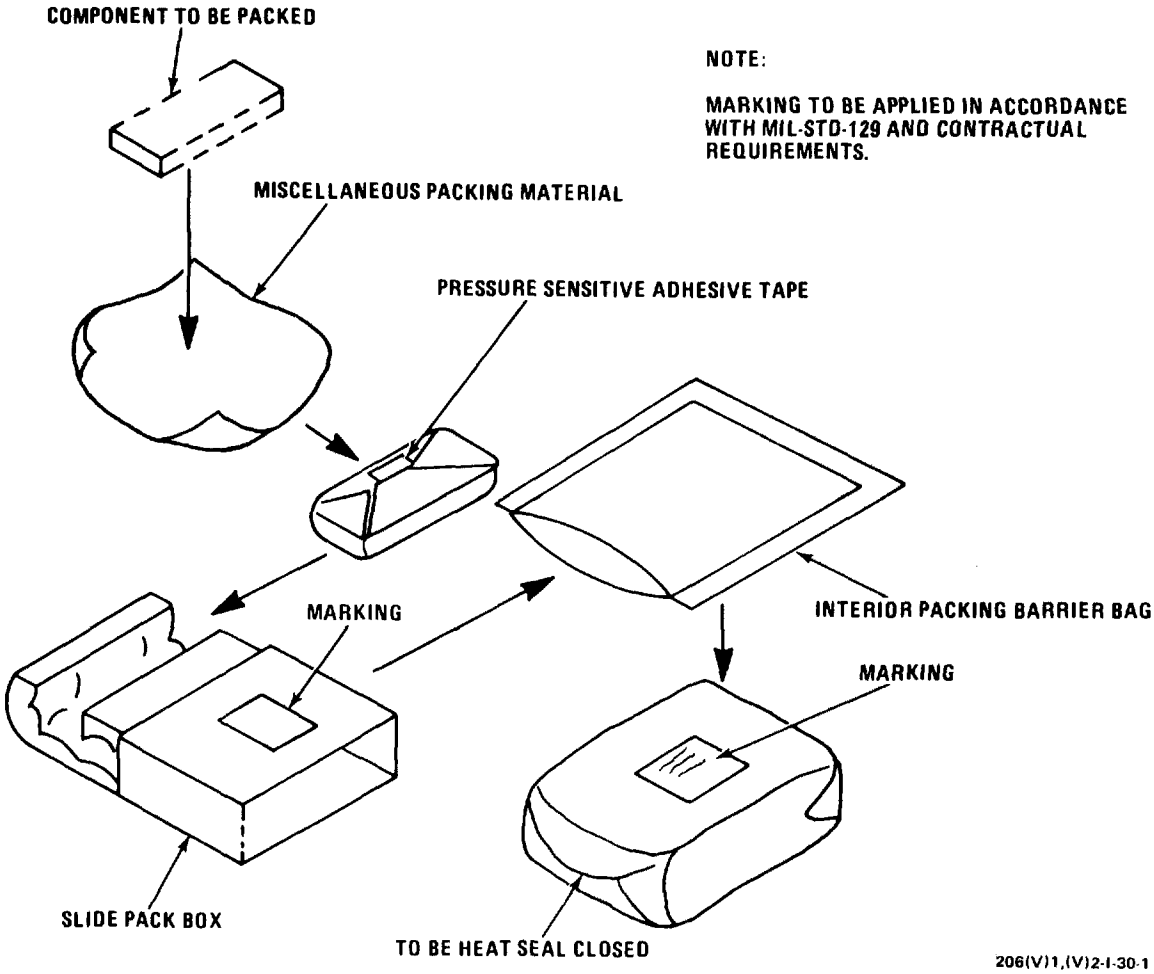


Figure 3-2. Assembly Packing and Unpacking (Sheet 1 of 2)

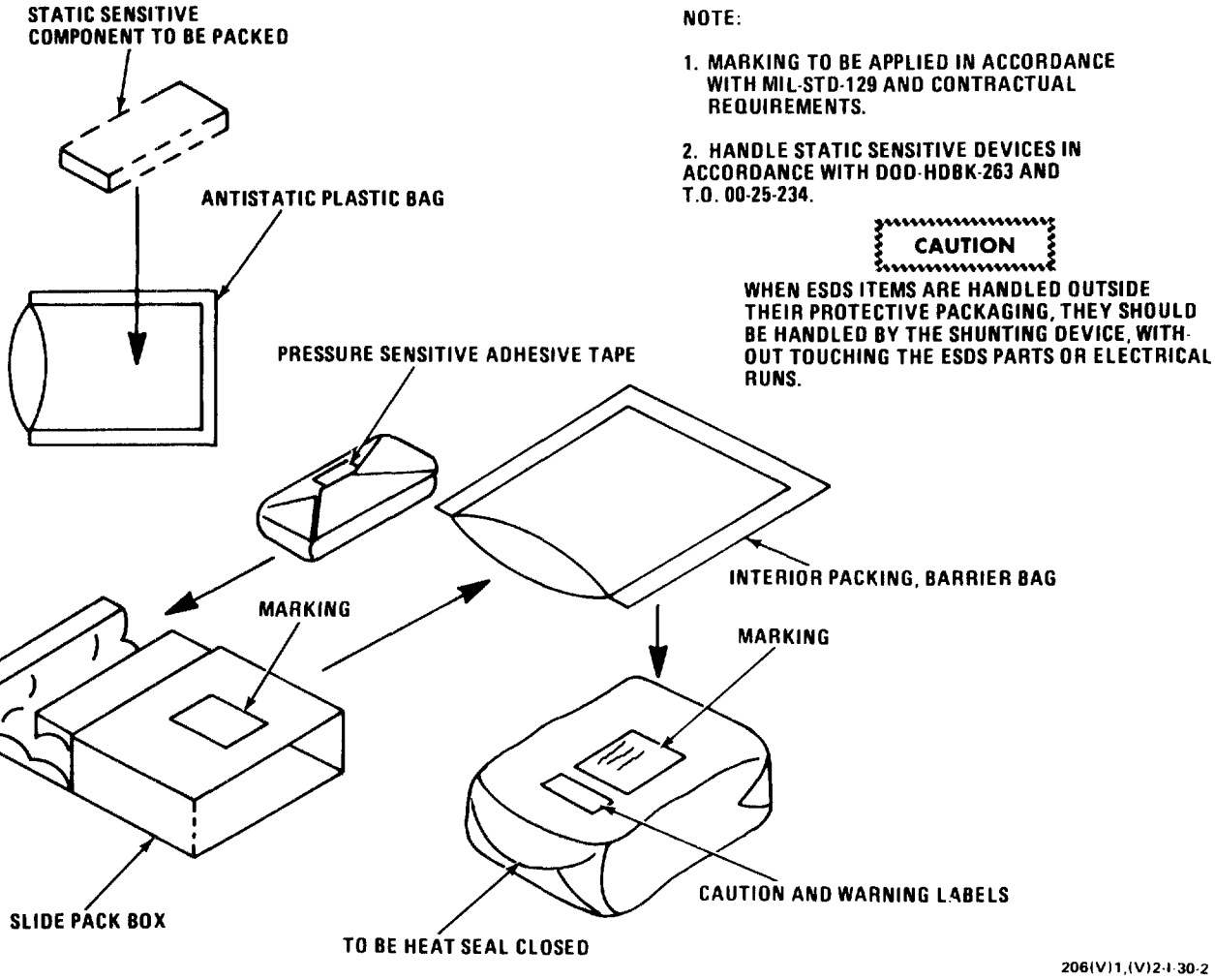
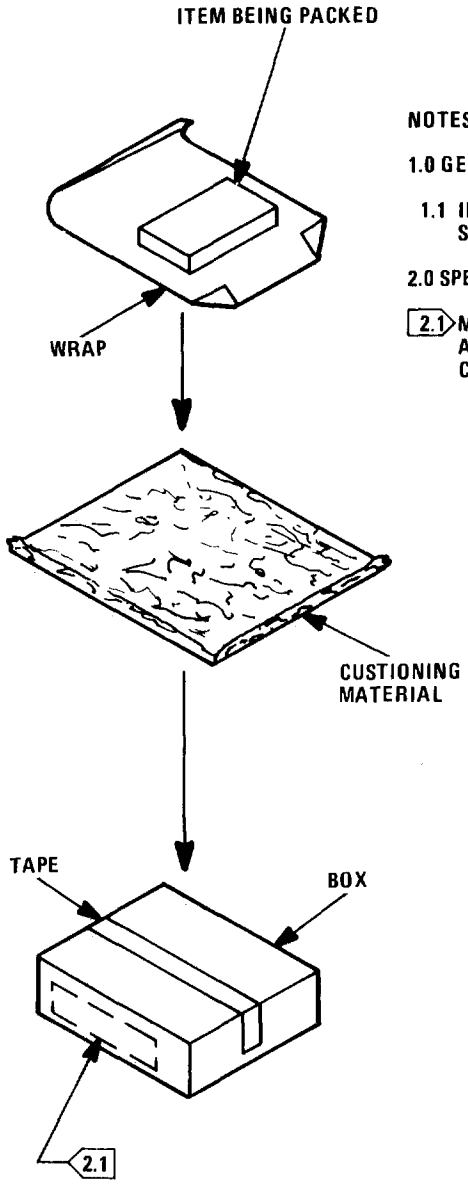


Figure 3-2. Assembly Packing and Unpacking (Sheet 2 of 2)



NOTES:

1.0 GENERAL

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-STD-100.

2.0 SPECIFIC

2.1 MARKING TO BE APPLIED IN AREA APPROXIMATELY AS SHOWN IN ACCORDANCE WITH MIL-STD-129 AND CONTRACTUAL REQUIREMENTS.

206(V)1,(V)2-1 40

Figure 3-3. Typical Packing Instructions for Mechanical Items

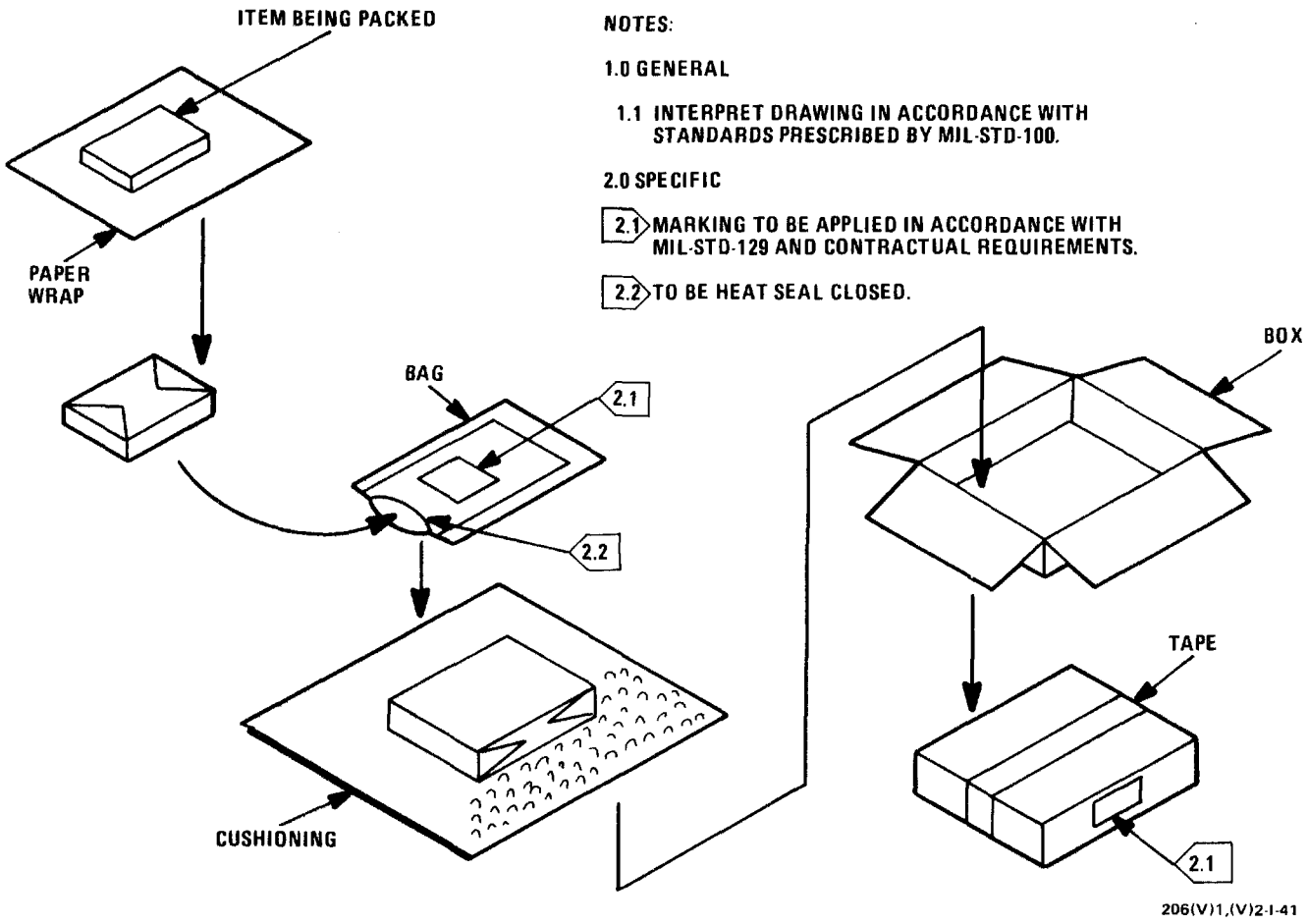


Figure 3-4. Typical Packing Instructions for Antennas and Cables

CHAPTER 4

OPERATION AND THEORY OF OPERATION

4-1. INTRODUCTION. This chapter provides information and instructions for the operation of Radio Communication System AN/GRC-206(V)1 and AN/GRC-206(V)2 (Radio System). Instructions for the operation of individual equipment is based upon operation of the equipment as part of the Radio System; therefore, unique capabilities of any of the Radio System components which are not within the scope of the Radio System task mission will not be covered. The individual equipment manuals listed in table 1-8 should be referenced for complete operating instructions for associated equipment. Also provided in this chapter is information covering theory of operation for the Radio System, RF subsystems, and LRUs. Equipments not contained in individual equipment manuals are discussed in detail. This chapter is divided into four sections: Section I, Operation; Section II, Functional System Operation; Section III, Functional Operation of Electronic Circuits; and Section IV, Functional Operation of Mechanical Assemblies.

Section I. OPERATION

4-2. GENERAL. This section describes and illustrates the controls and indicators of components which make-up the Radio Systems. It also provides general operating procedures for the Radio System and its RF subsystems. Refer to TO 31R2-2GRC206-1 for detailed operating procedures.

4-3. HF RADIO CONTROLS AND INDICATORS. Refer to figure 4-1 and table 4-1 for the location and functional description of each control, indicator and connector of the HF radio.

4-4. VHF-FM RADIO CONTROLS AND INDICATORS. The VHF-FM communication capability for the Radio System is provided by one of two user supplied transceivers; the RT-246 or the RT-524. Refer to figure 4-2 and table 4-2 for the location and functional description of each control, indicator, and connector of the two VHF-FM radios. Controls, indicators or connectors which are identical for both VHF-FM radios are described only once.

4-5. VHF/UHF-AM RADIO CONTROLS AND INDICATORS. Two Radio Set AN/VRC-83(V)1 (radio set) are supplied with each Radio System. One radio set will be operated in the VHF band (116.000 to 149.975 MHz), and the other radio set will be operated in the UHF band (225.000 to 399.975 MHz). Refer to figure 4-3 and table 4-3 for the location and functional description of each control, indicator, and connector of the VHF/ UHF-AM radio set.

4-6. RSC CONTROLS AND INDICATORS. Refer to figure 4-4 and table 4-4 for the location and functional description of each control, indicator, and connector of the RSC.

4-7. SDU CONTROLS AND CONNECTORS. Refer to figure 4-5 and table 4-5 for the location and functional description of each control and connector of the SDU.

4-8. POWER SWITCHBOARD CONTROLS AND INDICATORS. Refer to figure 4-6 and table 4-6 for the location and functional description of each control, indicator, and connector of the power switchboard.

4-9. VHF BITE PANEL CONNECTORS. Refer to figure 4-7 and table 4-7 for the location and functional description of each connector of the VHF BITE panel.

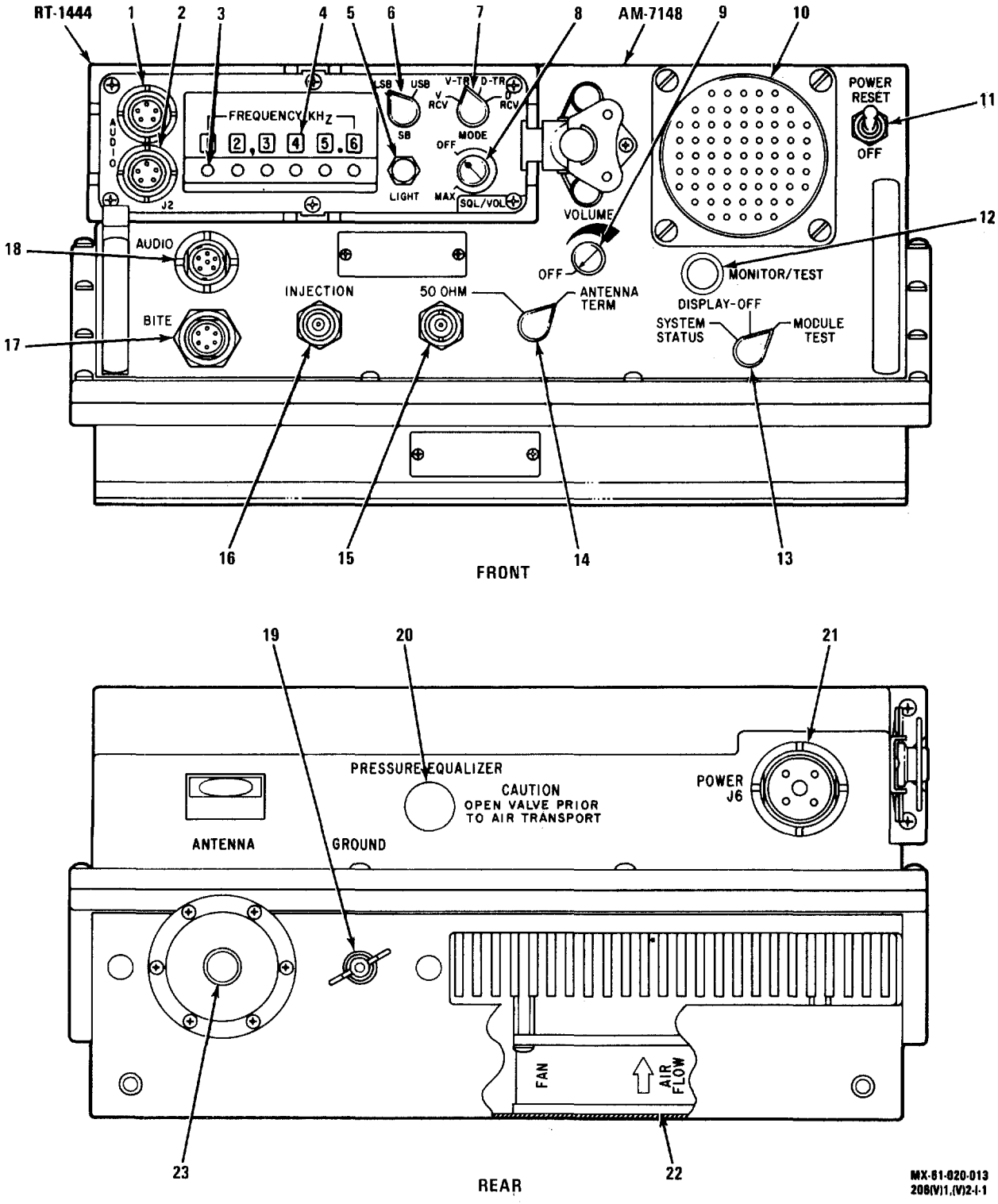


Figure 4-1. HF Radio Controls and Indicators

Table 4-1. HF Radio Controls, Indicators, and Connectors

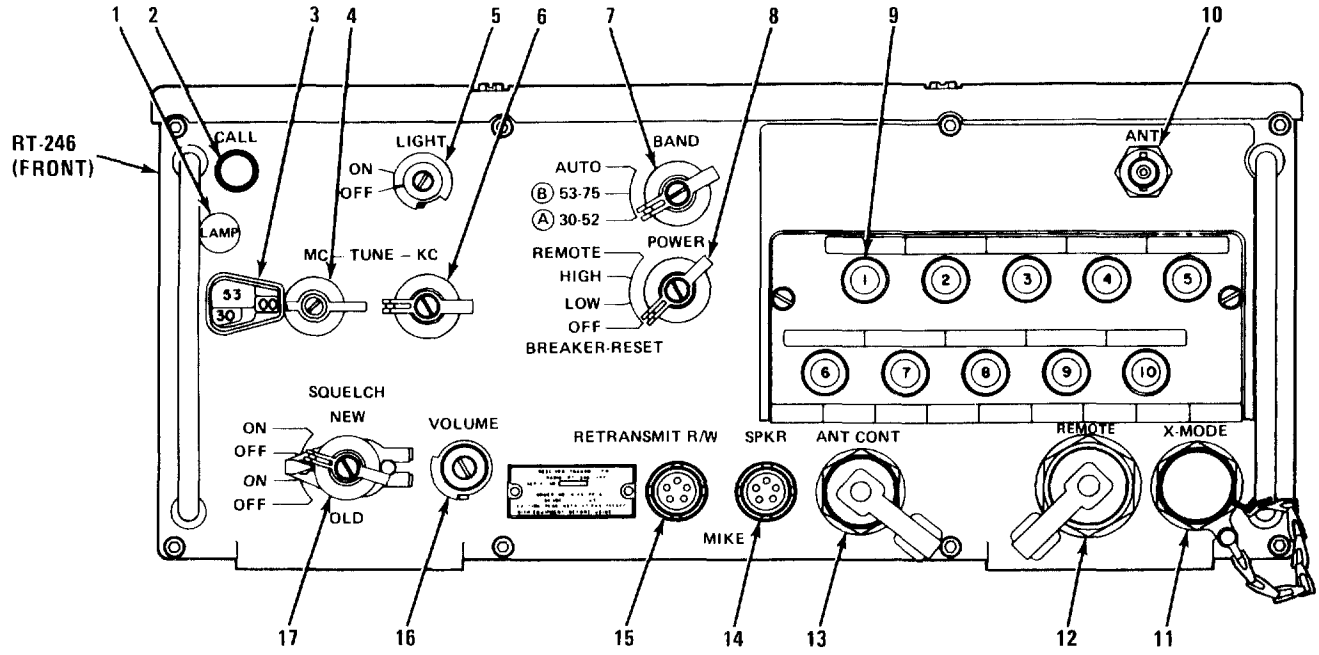
Figure 4-1 reference	Name	Function	Indication
1	AUDIO connector	Interfaces with handset to provide the receiver audio output, key line, and transmitter modulation input audio.	
2	AUDIO connector	Provides audio to the AM-7148 for the output speaker by means of cable 3W1 to item 18.	
3	FREQUENCY KHZ control (6 each)	Sets operating frequency; one control for each digit.	
4	FREQUENCY KHZ display window (6 each)	Displays selected frequency.	Displays one digit in each window.
5	LIGHT momentary push-button switch	When pushed, activates RT-1444 panel lighting circuit.	RT-1444 front panel lights come on.
6	SB two-position selector switch	Selects LSB or USB operation.	
7	MODE four-position selector switch	Selects the following modes: V RCV - voice, receive only. V TR - voice, transmit or receive. D TR - data, transmit or receive. D RCV - data, receive only.	
8	SQL/VOL control	Sets audio level to the handset. Also sets audio drive level to the AM-7148 for the audio amplifier and output speaker. In OFF position, turns operating power off to the RT-1444. Controls squelch for HF radio set when the radio set is being controlled by the RSC.	

Table 4-1. HF Radio Controls, Indicators, and Connectors-Continued

Figure 4-1 reference	Name	Function	Indication
9	VOLUME control	Controls volume of audio produced by the AM-7148. Also turns speaker output on/off.	
10	Speaker	Provides audio output in the receive mode. Output volume and on/off are controlled by item 9.	
11	POWER-RESET/OFF circuit breaker	Turns on primary power (+22.5 to +30 Vdc) for the radio set. Also resets primary power circuit breaker.	
12	7-bar light display indicator	Displays equipment status; mode is selected by item 13.	Alphanumeric display of equipment status.
13	MONITOR/TEST three-position selector switch	Selects operating mode of test and display (item 12):	
		SYSTEM STATUS position-selects system monitor mode. Symbol displayed on item 12 permits fault isolation to the organizational maintenance level.	Item 12 should show a momentary 8, then 0, then go blank. If any display other than 8, 0, then blank is shown, refer to Chapter 5, maintenance.
		DISPLAY OFF position - blanks item 12 to prevent lgiht output.	Item 12 should be blank.
		MODULE TEST position - selects AM-7148 module (assembly) test mode. Symbol displayed on item 12 permits intermediate level fault isolation to the unit/assembly.	Item 12 should show a momentary 0, then go blank. If any display other then 0, then blank is shown, refer to Chapter 5, maintenance.
14	ANT SEL two-position selector switch	Applies output rf power to either item 15 or item 23.	

Table 4-1. HF Radio Controls, Indicators, and Connectors-Continued

Figure 4-1 reference	Name	Function	Indication
15	50 OHM rf connector (type BNC)	Provides interface with an optional rf dummy load for test purposes, or to a 50-ohm antenna with VSWR less than 1.3:1.0.	
16	INJECTION rf connector (type BNC)	Provides direct connection to the RT-1444 via the AM-7148 to operate from an external frequency standard.	
17	BITE connector	Provides monitoring of the built-in test equipment (BITE). Interfaces with the SDU via interconnect cable 4W9.	None. Lites FAULT indicator on RSC when HF radio is selected and the rf output power has dropped 3 dB below the specified power rating. An audible two tone signal heard in the handset/headset accompanies the visual FAULT indicator.
18	AUDIO connector	Audio input for the AM-7148; interfaces with item 2 on the RT-1444 via interconnect cable 3W1.	
19	GROUND terminal	Connects the radio set to earth grounding rod or vehicular ground.	
20	PRESSURE EQUALIZER valve	Provides a means to allow the atmospheric pressure to be equalized (used primarily for air transport).	
21	POWER connector	Used to connect the AM-7148 to a primary power (+22.5 to +30 Vdc) source.	
22	Fan	Provides cooling for the AM-7148 (automatically controlled).	
23	ANTENNA connector	Provides interface with antenna; whip, NVIS or long wire.	



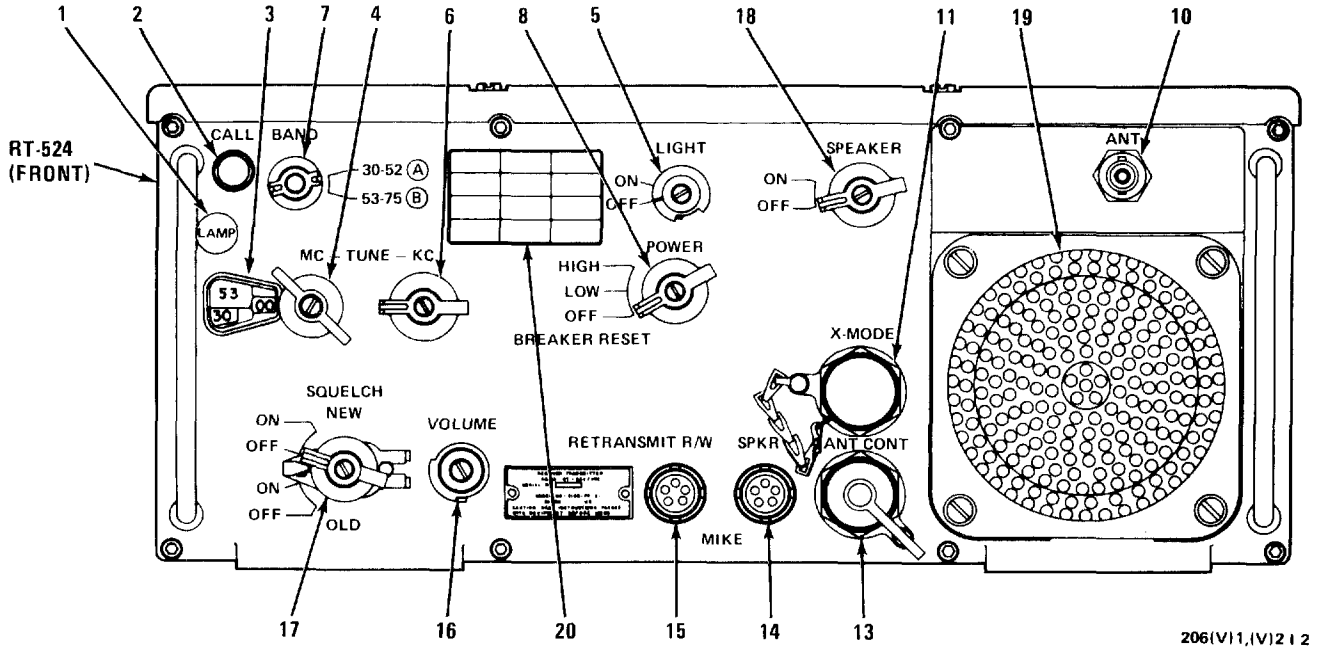


Figure 4-2. VHF-FM Radio Controls and Indicators

Table 4-2. VHF-FM Radio Controls, Indicators, and Connectors

Figure 4-2 reference	Name	Function	Indication
1	LAMP indicator	Provides light for dial window (item 3).	Lights when LIGHT switch (item 5) is on.
2	CALL indicator	Indicates when a signal is being received during SQUELCH operation.	Lights when a signal is being received.
3	Dial window display	Displays manually tuned frequencies selected by items 4 and 6. On RT-246, also indicates the frequency of a preset channel selected at the RSC.	Outer section of the dial window displays frequencies selected by item 4 in 1 MHz steps. Inner section of the dial window displays frequencies selected by item 6 in 50 kHz steps.
4	MC-TUNE control	Provides manual tuning of the radio in 1 MHz steps.	Tuned frequency is displayed in outer section of dial window (item 3).
5	LIGHT switch	Turns power to lamp indicator (item 1) ON/OFF.	In ON position; the lamp indicator and dial window display lights.
6	KC-TUNE control	Provides manual tuning of the radio in 50 kHz steps.	Tuned frequency is displayed in inner section of dial window (item 3).
7	BAND selector switch	Selects frequency bands. Sets the radio for tuning bands B (53.00 to 75.95 MHz) or A (30.00 to 52.94 MHz). On RT-246 it also allows automatic selection (in AUTO position) of radio tuning when the pushbuttons (item 9) or remote operation is used.	
8	POWER selector switch	Turns dc power to the radio on/off and selects rf transmit power.	

Table 4-2. VHF-FM Radio Controls, Indicators, and Connectors-Continued

Figure 4-2 reference	Name	Function	Indication
8-Cont		OFF BREAKER-RESET position - turns off dc power to radio; resets circuit breakers when they are tripped. LOW position - turns on dc power to radio; selects low rf power (0.5 to 10 watts) transmit mode. HIGH position - turns on dc power to radio; selects high rf power (35 watts minimum) transmit mode. REMOTE position - transfers control of dc power and selection of RT frequency to the RSC when cable 4W15(P2) is connected to item 12 (RT-246 only).	
9	Pushbutton (10 each, RT-246 only)	Provides selection of up to ten preset channels when the BAND select switch is at the AUTO position.	During pushbutton tuning, the frequency selected by the pushbutton is displayed in the dial window (item 3).
10	ANT connector	Used to connect VHF-FM antenna cable 4W16(P2) to the radio.	
11	X-MODE connector	Used to connect SDU control cable 4W19(P3) to the radio.	
12	REMOTE connector	Used to connect SDU control cable 4W15(P2) to the radio (RT-246 only).	

Table 4-2. VHF-FM Radio Controls, Indicators, and Connectors-Continued

Figure 4-2 reference	Name	Function	Indication
13	ANT CONT connector	Used to connect FM antenna control cable W8(P1) to the radio.	
14	SPKR connector	Not used in this configuration.	
15	RETRANSMIT R/W connector	Used to connect SDU control cable 4W19(P2) to the radio during secure voice operation; Radio Communication System AN/GRC-206(V)1 only. Used to connect SDU audio cable W17(P2) during nonsecure voice operation.	
16	VOLUME control	Adjusts the audio output volume to any handset or headset connected to SPKR/RETRANSMIT R/W connector. Also controls the audio output volume from the speaker (item 19) on RT-524.	
17	SQUELCH selector switch	Turns squelch ON or OFF. Also allows selection between OLD (carrier noise), and NEW (tone signal) squelch types.	
18	SPEAKER control	Turns front panel loudspeaker on RT-524 OFF or ON.	
19	Loudspeaker	Provides audio output in the receive mode for RT-524 when item 18 is in ON position.	
20	Frequency write-in plate	Provides space to write-in authorized operating frequencies.	

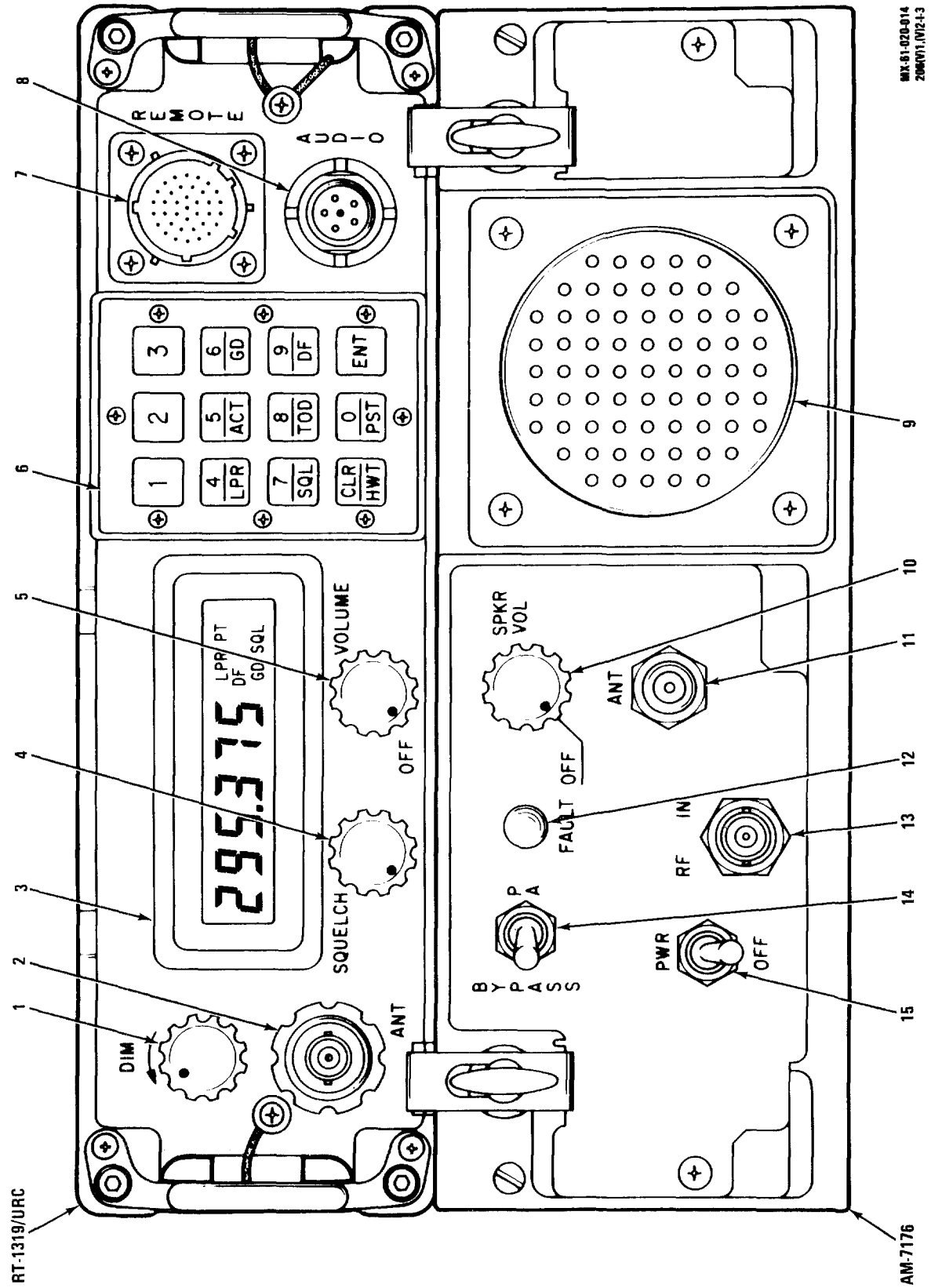


Figure 4-3. VHF/UHF-AM Radio Set Controls and Indicators

Table 4-3. VHF/UHF-AM Radio Set Controls, Indicators, and Connectors

Figure 4-3 reference	Name	Function	Indication
1	DIM control	Turns edge lighting ON and raises or lowers display intensity.	
2	ANT connector	Used to connect the rf input cable (supplied with AN/VRC-83) to the RT-1319.	
3	Display (LCD)	Displays operating modes, frequencies, preset channels and low voltage condition.	Displays data and modes selected by the keyboard (item 6). A blinking decimal point indicates a low input voltage condition.
4	SQUELCH control	Adjusts the squelch level after the squelch (SQL) mode has been selected by the keyboard.	
5	VOLUME control	Turns the RT-1319 on or OFF, and adjust the audio level to the AUDIO connector (item 8).	
6	Keyboard	Used to manually set operating frequencies, operating modes, and preset channel frequencies into the RT-1319.	All keyboards entries effect the display (item 3) presentation.
		1 key - enters the number 1.	Number 1 lights on the display.
		2 key - enters the number 2.	Number 2 lights on the display.
		3 key - enters the number 3.	Number 3 lights on the display.
		$\frac{4}{\text{LPR}}$ key - enters the numbers 4 or selects low power mode of opation.	Number 4 lights on the display; LPR lights on display when low power mode is selected.

Table 4-3. VHF/UHF-AM Radio Set Controls, Indicators, and Connectors-Continued

Figure 4-3 reference	Name	Function	Indication
6-Cont		5 ACT key - enters the number 5; ACT function not used with this radio configuration.	Number 5 lights on the display.
		6 GD key - enters the number 6 or selects guard receiver mode of operation.	Number 6 lights on the display; GD lights on the display when guard receiver mode is selected.
		7 SQL key - enters the number 7 or selects squelch mode of operation.	Number 7 lights on the display; SQL lights on the display when squelch mode is selected.
		8 TOD key - enters the number 8; TOD function not used with this radio configuration.	Number 8 lights on the display.
		9 DF key - enters the number 9 or selects direction finding mode of operation.	Number 9 lights on the display; DF lights on the display and 1000 hertz tone is audible at the handset/headset and speaker when the direction finding mode is selected.
		CLR HWT key - clears (erases) errors made during keyboard entries; HWT function not used with this radio configuration.	Removes the last display indication entered through the keyboard.
		0 PST key - enters the number 0 or selects the preset mode of operation.	Number 0 lights on the display; P- (channel number) lights on the display for preset operation, or LP- lights on display if key is pressed after entering new frequency and while display is blinking. P- indicates preset, LP- indicates load preset.

Table 4-3. VHF/UHF-AM Radio Set Controls, Indicators, and Connectors-Continued

Figure 4-3 reference	Name	Function	Indication
6-Cont		ENT key - enters displayed frequency or preset channel number and relights display.	Display stops blinking. Relights display for approximately 30 seconds after key is depressed.
7	REMOTE connector	Used to connect SDU control cable 4W13(P2) to the radio set.	
8	AUDIO connector	Used to connect SDU audio cable 4W14(P2) to the radio set during secure voice operation; Radio Communication System AN/GRC-206(V)1 only. Used to connect SDU audio cable 4W12(P2) to the radio set during nonsecure voice operation.	
9	Loudspeaker	Provides audio output in the receive mode. Output volume and on/off are controlled by item 10.	
10	SPKR VOL control	Turns loudspeaker ON or OFF, and controls the volume level of the loudspeaker.	
11	ANT connector	Used to connect VHF/UHF antenna cables W5 (UHF) or W6 (VHF) to the radio set.	
12	FAULT indicator	Indicates status of the linear power amplifier.	When lit indicates a fault in PA or that BYPASS is selected.
13	RF IN connector	Used to connect the rf input cable to the AM-7176.	

Table 4-3. VHF/UHF-AM Radio Set Controls, Indicators, and Connectors-Continued

Figure 4-3 reference	Name	Function	Indication
14	BYPASS-PA switch	PA position activates the linear power amplifier (PA) which increases the rf output to 30 watts. BYPASS position disables the PA to allow normal RT-1319 operation.	Fault lamp (item 12) lights when switch is in BYPASS.
15	PWR/OFF POWER switch	Turns input power to the radio set ON or OFF.	

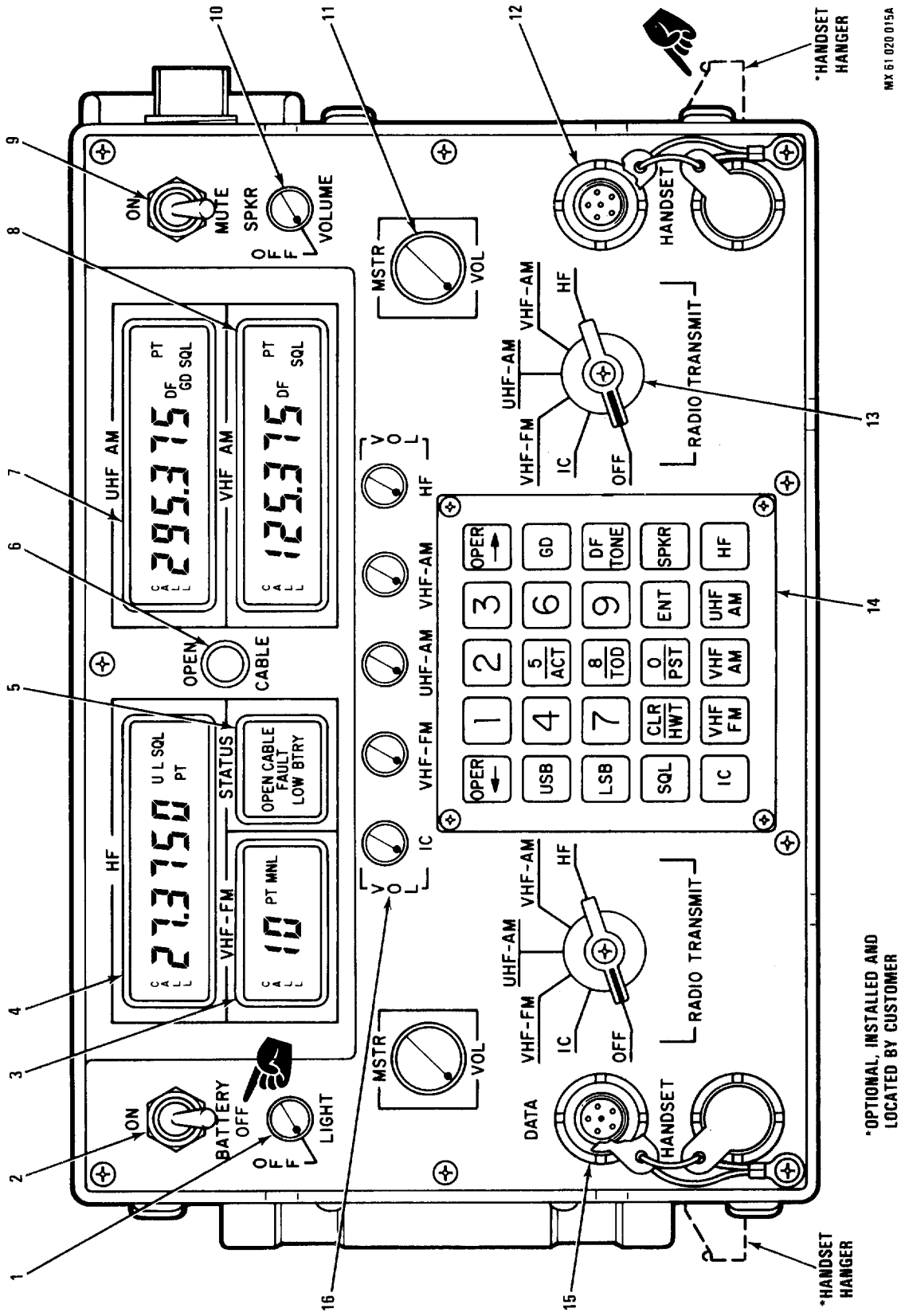


Figure 4-4. Radio Set Control (RSC) Controls and Indicators

Table 4-4. RSC Controls, Indicators, and Connectors

Figure 4-4 reference	Name	Function	Indication
1	LIGHT control	Turns display lighting ON or OFF, and adjusts the display lighting intensity.	
2	BATTERY switch	Applies battery power to the RSC, when set to ON position.	
3	VHF-FM display	Displays the selected preset channel of the VHF-FM radio (RT-246 only).	The selected preset channel is displayed with two numeric characters.
		Displays operating mode characters.	PT is lit on the display when the VHF-FM radio is operating in the nonsecure voice mode. PT blinks ON and OFF when the system is in COMSEC OVERRIDE mode. CALL is lit on the display when the VHF-FM radio is receiving a signal. MNL is lit on the display when RT-524 is used as the VHF-FM radio for the Radio System.
4	HF display	Displays any one of 280,000 available HF channel frequencies.	The selected frequency displayed with six numeric characters.
		Displays operating mode characters.	U is lit on the display when the HF radio is operating in the upper sideband mode. L is lit on the display when the HF radio is operating in the lower sideband mode.

Table 4-4. RSC Controls, Indicators, and Connectors-Continued

Figure 4-4 reference	Name	Function	Indication
4-Cont			SQL is lit on the display when the squelch mode of operation is selected for the HF radio. PT is lit on the display when the HF radio is operating in the non-secure voice mode. PT blinks ON and OFF when the system is in COMSEC OVERRIDE mode. CALL is lit on the display when the HF radio is receiving a signal. n tr = 2 (4) is lit on the display when the two or four transmitter mode is selected. SEC oN (oFF) is lit on the display when the COMSEC OVERRIDE mode is selected.
5	STATUS display	Displays fault indications for the Radio System.	OPEN CABLE is lit on the display when data from the SDU has been interrupted for more than 125 microseconds. FAULT is lit on the display when the rf output power from any radio set has dropped 3 dB below the specified power rating. LOW BTRY is lit on the display when the battery voltage in the RSC is less than +11 Vdc.

Table 4-4. RSC Controls, Indicators, and Connectors-Continued

Figure 4-4 reference	Name	Function	Indication
6	OPEN CABLE indicator	Provides visual open cable indication which is obvious to the operator under all conditions of day or night outside lighting.	Indicator is lit when data from the SDU has been interrupted for more than 125 microseconds.
7	UHF AM display	Displays any one of 7000 available UHF channel frequencies.	
		Displays operating mode characters.	PT is lit on the display when the UHF-AM radio is operating in the non-secure voice mode. PT blinks ON and OFF when the system is in COMSEC OVERRIDE mode. DF is lit on the display when the UHF-AM radio is operating in the direction finding mode. GD is lit on the display when the UHF-AM radio is operating in the guard receiver mode. SQL is lit on the display when the UHF-AM radio is operating in the squelch mode. CALL is lit on the display when the UHF-AM radio is receiving a signal.
8	VHF-AM display	Displays any one of 1360 available VHF channel frequencies.	
		Displays operating mode characters.	PT is lit on the display when the VHF-AM radio is operating in the non-secure voice mode.

Table 4-4. RSC Controls, Indicators, and Connectors-Continued

Figure 4-4 reference	Name	Function	Indication
8-Cont			PT blinks ON and OFF when the system is in COMSEC OVERRIDE mode. DF is lit on the display when the VHF-AM radio is operating in the direction finding mode. GD is lit on the display when the VHF-AM radio is operating in the guard receiver mode. SQL is lit on the display when the VHF-AM radio is operating in the squelch mode. CALL is lit on the display when the VHF-AM radio is receiving a signal.
9	MUTE switch	Selects the RSC speaker muting function: MUTE position - provides automatic speaker muting whenever a transmitter is keyed or the keyline is activated for intercommunications. ON position - bypasses speaker muting circuitry.	
10	SPKR VOLUME control	Turns the RSC speaker OFF, and adjusts the audio output level.	
11	MSTR VOL control (2 each)	Controls the audio level from any combination of radio sets, and intercom audio.	

Table 4-4. RSC Controls, Indicators, and Connectors-Continued

Figure 4-4 reference	Name	Function	Indication
12	HANDSET connector (4 each)	Used to connect the handset or headset to the RSC.	
13	RADIO TRANSMIT selector switch (2 each)	Selects any of four radios or the intercommunications system for transmit and receive, or receive only operation: OFF position - allows the operator to monitor (receive only) communications on the radio sets selected by the keyboard; allows the operator to select 1 or 5 minute back lighting timeout. IC position - allows the RSC operators to talk to each other through the handsets/ headsets. VHF-FM position - selects the VHF-FM radio set for transmit and receive operation. UHF-AM position - selects the UHF-AM radio set for transmit and receive operation. VHF-AM position - selects the VHF-AM radio set for transmit and receive operation. HF position - selects the HF radio set for transmit and receive operation.	

Table 4-4. RSC Controls, Indicators, and Connectors-Continued

Figure 4-4 reference	Name	Function	Indication
14	Keyboard	Used to manually set operating frequencies, operating modes, and preset channel frequencies for the Radio System remote controllable radios.	
		1 key - enters the number 1.	Number 1 lights on selected display.
		- Select COMSEC enable	
		- Used with RADIO TRANSMIT switch to select 1 minute back lighting mode.	
		2 key - enters the number 2.	Number 2 lights on selected display.
		- Used with 2 or 4 transmitter mode.	
		3 key - enters the number 3.	Number 3 lights on selected display.
		4 key - enters the number 4.	Number 4 lights on selected display.
		- Used with 2 or 4 transmitter mode.	
		5/ACT key - enters the number 5.	Number 5 lights on selected display.
		- Used with RADIO TRANSMIT switch to select 5 minute back lighting mode.	
		- ACT function is not used in this system configuration.	
		6 key - enters the number 6.	Number 6 lights on selected display.

Table 4-4. RSC Controls, Indicators, and Connectors-Continued

Figure 4-4 reference	Name	Function	Indication
14-Cont		7 key - enters the number 7.	Number 7 lights on selected display.
		8 TOD key - enters the number 8. TOD function is not used in this system configuration.	Number 8 lights on selected display.
		9 key - enters the number 9.	Number 9 lights on selected display.
		0 PST key - 0 enters the number 0. - 0 Used with COMSEC OVERRIDE mode. - PST selects preset mode of operation.	Number 0 lights on selected display. P- (preset) or LP- (load preset) lights on the VHF-AM or UHF-AM display when the preset mode of operation is selected for VHF/UHF-AM radio.
		CLR HWT key - is used to clear (erase) errors made while entering data through the keyboard. HWT function is not used in this system configuration.	Removes the last display indication entered through the keyboard.
		ENT key - Used at the beginning or completion of keyboard operations to enter data or to perform the following functions: Stops blinking display and enters displayed data into selected radio.	Displayed data stops blinking.

Table 4-4. RSC Controls, Indicators, and Connectors-Continued

Figure 4-4 reference	Name	Function	Indication
14-Cont		Displays a preset frequency stored in the VHF-AM or UHF-AM radio.	Displays operating frequency of selected preset channel when the VHF-AM or UHF-AM radio is in the preset mode and the ENT key is depressed.
		Tunes the selected HF, VHF-AM or UHF-AM radio to the frequency entered through the keyboard. HF key - selects output audio from the HF radio to be applied to the handset/headset and RSC speaker. VHF FM key - selects output audio from the VHF-FM radio to be applied to the handset/headset and RSC speaker. VHF AM key - selects output audio from the VHF-AM radio to be applied to the handset/headset and RSC speaker. UHF AM key - selects output audio from UHF-AM radio to be applied to the handset/headset and RSC speaker. IC key - selects intercommunications audio to be applied to the handset/headset and RSC speaker.	Operating frequency is displayed on the HF, VHF-AM or UHF-AM display.

Table 4-4. RSC Controls, Indicators, and Connectors-Continued

Figure 4-4 reference	Name	Function	Indication
14-Cont		OPER ← key - applies entries from the keyboard to the radio set selected by the RSC lefthand RADIO TRANSMIT selector switch.	When depressed, frequency of selected display goes blank. All selected operating modes are displayed.

Table 4-4. RSC Controls, Indicators, and Connectors-Continued

Figure 4-4 reference	Name	Function	Indication
14-Cont		OPER → key - applies entries from the keyboard to the radio set selected by the RSC righthand RADIO TRANSMIT selector switch.	When depressed, frequency of selected display goes blank. All selected operating modes are displayed.
		USB key - selects the upper sideband mode of operation for the HF radio.	U lights on the HF display when the upper sideband mode is selected.
		LSB key - selects the lower sideband mode of operation for the HF radio.	L lights on the HF display when the lower sideband mode is selected.
		SQL key - selects the squelch mode of operation for the HF, VHF-AM, and UHF-AM radios.	SQL lights on the selected HF, VHF-AM or UHF-AM display when the squelch mode is selected.
		GD key - selects the guard receiver mode of operation for the UHF-AM or VHF-AM radio.	GD lights on the UHF-AM or VHF-AM display when the guard receiver mode is selected.
		DF TONE key - selects the direction finding tone mode of operation for the VHF-AM or UHF-AM radio sets.	DF lights on the selected VHF-AM or UHF-AM display when the direction finding mode is selected. Also a momentary 1000 hertz tone is audible at the handset/ headset and RSC speaker.
		SPKR key - selects the RSC speaker operation.	
15	DATA/HANDSET connector	Used to connect the AN/ PSC-2 Digital Communications Terminal (DCT) to the RSC.	
16	VOL controls (5 each)	Permits independent level (volume) adjustment of receive audio routed to the RSC HANDSET connector and speaker from each radio set.	

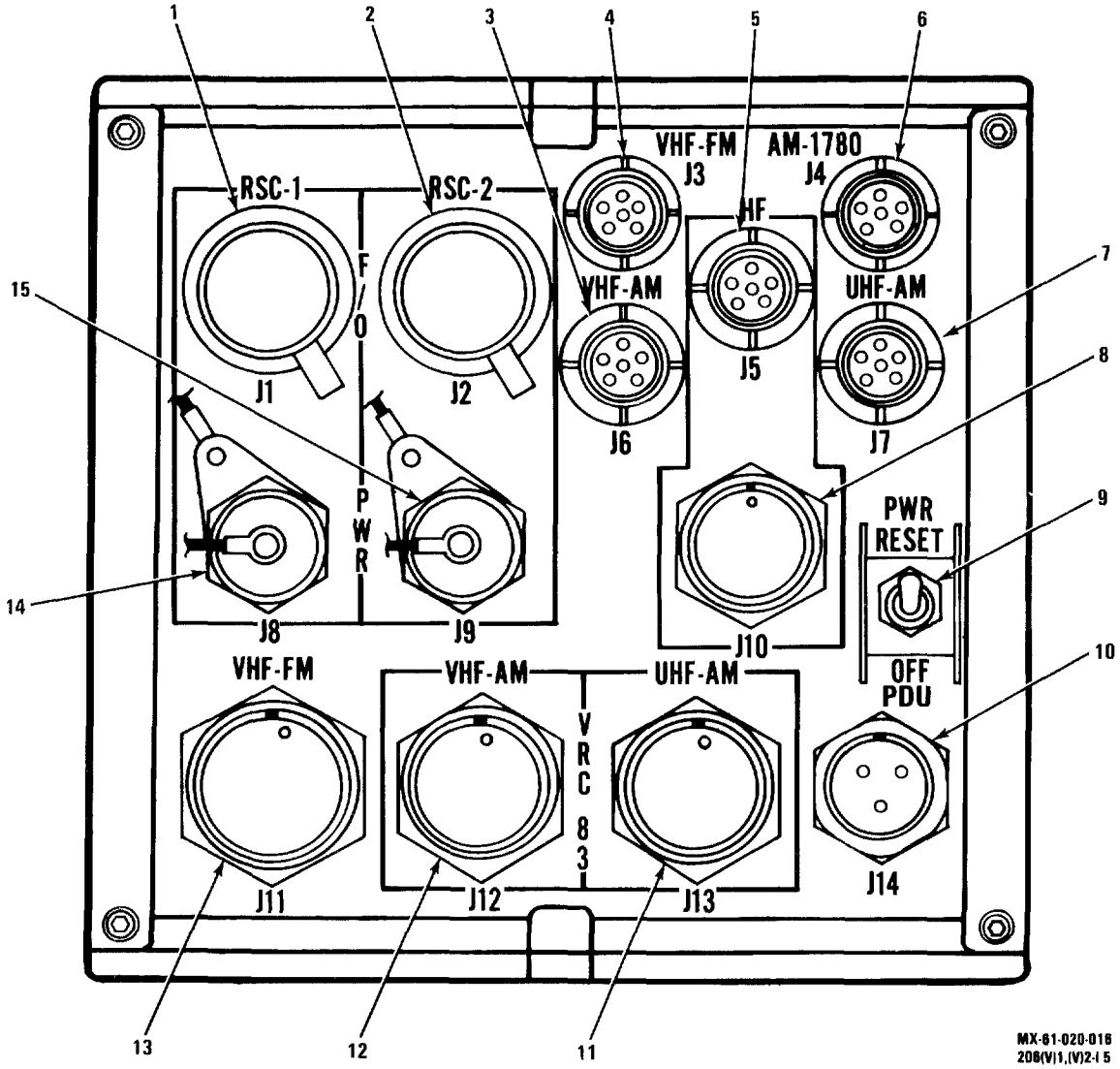


Figure 4-5. Signal Distribution Unit (SDU) Controls and Connectors

Table 4-5. SDU Controls and Connectors

Figure 4-5 reference	Name	Function	Indication
1	RSC-1 J1 connector	Used to connect fiber optic cable W9, W10 or W11.	
2	RSC-2 J2 connector	Used to connect fiber optic cable W9, W10 or W11.	
3	VHF-AM J6 connector	Used to connect audio cable 4W12.	
4	VHF-FM J3 connector	Used to connect audio cable 4W17.	
5	HF J5 connector	Used to connect audio cable 4W11.	
6	AM-1780 J4 connector	Used to connect audio cable W12; used with the M-113 vehicle interface only.	
7	UHF-AM J7 connector	Used to connect audio cable 4W12.	
8	HF J10 connector	Used to connect control cable 4W9.	
9	PWR-RESET/OFF switch	Provides ON/OFF switching and voltage overload protection for +28 Vdc applied to the SDU.	
10	PDU J14 connector	Used to connect power cable 4W4.	
11	UHF-AM J13 connector	Used to connect control cable 4W13.	
12	VHF-AM J12 connector	Used to connect control cable 4W13.	
13	VHF-FM J11 connector	Used to connect control cable 4W15.	
14	RSC-1 J8 connector	Used to connect power cable W3.	
15	RSC-1 J9 connector	Used to connect power cable W3.	

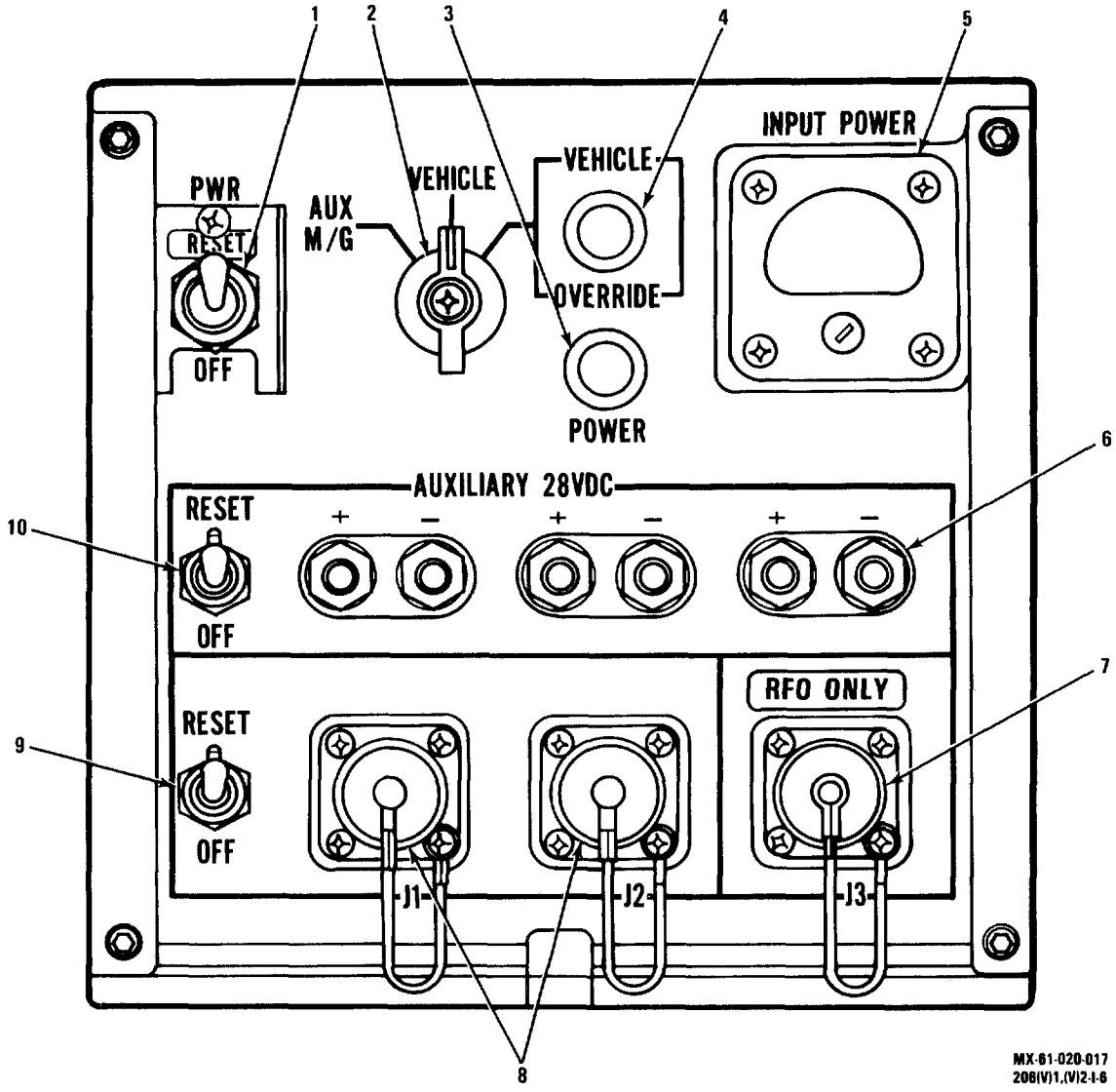


Figure 4-6. Power Switchboard Controls and Indicators

Table 4-6. Power Switchbord Controls, Indicators, and Connectors

Figure 4-6 reference	Name	Function	Indication
1	PWR-RESET/OFF switch	Provides ON/OFF switching and voltage overload protection for primary power input to the power switchboard.	POWER indicator lamp (item 3) lights when the switch is set to PWR position.
2	AUX M/G/VEHICLE/ VEHICLE OVERRIDE switch	Selects any one of three primary input power positions: AUX M/G position - primary input power is supplied from an auxiliary motor generator. VEHICLE position - primary input power is supplied from the vehicle (M-151 or M-113) electrical system. VEHICLE OVERRIDE position - primary input power is supplied from the vehicle (M-151 or M-113) battery.	VEHICLE OVERRIDE indicator lamp (item 4) lights when the switch is set to VEHICLE OVERRIDE position.
3	POWER indicator (green lens)	Visually indicates whether power to the power switchboard is turned on or off.	Lights when PWR switch (item 1) is in PWR position.
4	VEHICLE OVERRIDE indicator (amber lens)	Provides visual indication to warn operator that the Radio System is being powered by the vehicle battery.	Lights when power selector switch (item 2) is set to VEHICLE OVERRIDE position.
5	INPUT POWER meter	Monitors input voltage to the power switchboard.	Meter reading indicates magnitude of dc input voltage.
6	AUXILIARY 28 VDC binding post (3 pair)	Provides interconnect points for miscellaneous 28 volt operated accessories.	

Table 4-6. Power Switchboard Controls, Indicators, and Connectors-Continued

Figure 4-6 reference	Name	Function	Indication
7	AUXILIARY 28 VDC J3 connector	Provides reserve no-break-power from the vehicle battery; this connector will not be used in this Radio System configuration.	
8	AUXILIARY 28 VDC J1 and J2 connectors	Provides +28 Vdc for auxiliary equipment.	
9	AUXILIARY RESET/OFF switch	Provides overload protection and power on/off switching for connectors J1 and J2 (item 8).	
10	AUXILIARY 28 VDC RESET/OFF switch	Provides overload protection and power on/off switching for binding post (item 6).	

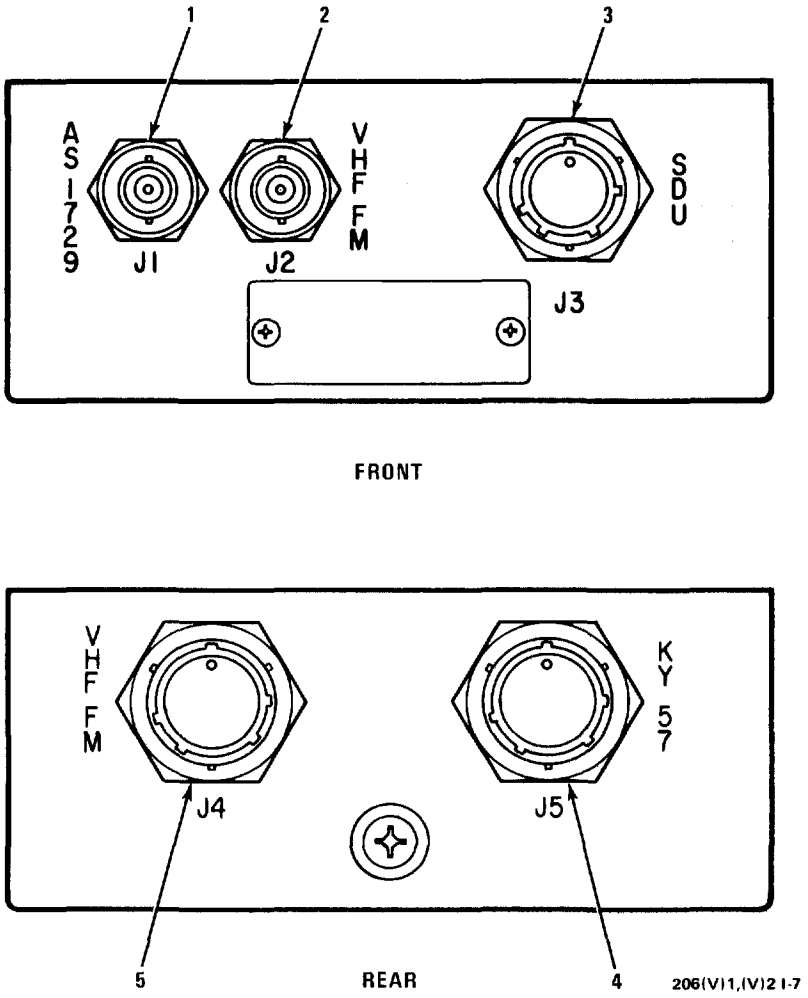


Figure 4-7. VHF BITE Panel Connectors

Table 4-7. VHF BITE Panel Connectors

Figure 4-7 reference	Name	Function	Indication
1	AS-1729 J1 connector	Used to connect antenna cable W7.	
2	VHF FM J2 connector	Used to connect antenna cable 4W16.	
3	SDU J3 connector	Used to connect control cable 4W15B.	
4	KY-57 J5 connector	Used to connect cable 4W18 during secure voice operation; used on Radio Communication System AN/GRC-206(V)1 only.	
5	VHF FM J4 connector	Used to connect cable 4W19.	

4-10. OPERATING INSTRUCTIONS. The following subparagraphs provides general procedures for operating the Radio System. If detailed operating procedures are required, refer to TO 31R2-2GRC206-1. Starting, warm-up or adjustment procedures for the vehicle (M-151 or M-113) power generating system, or the auxiliary motor generator are not contained in this manual. Refer to TO 35C2-3-388-1 for operating procedures on the auxiliary motor generator, and TM 9-2320-218-10 and TM 9-2300-257-10 for operating procedures on the M-151 and M-113 vehicle, respectively.

a. Turn-On Procedures. To turn-on the Radio System proceed as follows:

(1) Refer to figure FO-7 and verify cable connections are secure and properly connected for desired Radio System configuration. Also check equipment (Radio System, auxiliary motor generator, NVIS antenna) during fixed station operations.

(2) Start primary power source (vehicle engine, motor generator). Refer to equipment manuals for starting, warm-up and adjustment procedures. Adjust power source to supply +28 Vdc to the power switchboard.

(3) On the power switchboard, rotate AUG M/G - VEHICLE - VEHICLE OVERRIDE switch to the position applicable to primary power source.

(4) Set PWR-RESET/OFF circuit breaker on power switchboard to PWR position. POWER indicator lamp will light.

(5) On the HF radio perform the following steps:

(a) On the AM-7148, rotate MONITOR TEST selector switch to SYSTEM STATUS position. SYSTEM STATUS position for normal operation, MODULE TEST position selects AM-7148 module (assembly) test mode.

(b) Rotate AM-7148, 50 OHM/ANTENNA TERM selector switch to ANTENNA TERM position. 50 OHM position if connected to a dummy load.

(c) Rotate RT-1444, SQL/VOL control three-fourths (3/4) turn clockwise.

(d) Set AM-7148, POWER RESET/OFF circuit breaker to RESET position. MONITOR TEST indicator should show a momentary 8, then 0, then blank.

(6) On VHF-FM radio (RT-246/VRC or RT-524/VRC) perform the following steps:

(a) Rotate POWER selector switch to HIGH position. On RT-246, rotate POWER switch to REMOTE position if preset channel selection will be accomplished using RSC.

(b) Rotate BAND selector switch to A or B position. On RT-246, rotate BAND switch to AUTO position if preset channel selection will be accomplished using RSC.

NOTE

Prior to using the RSC to select a VHF-FM preset channel frequency, the preset channel frequencies must be manually loaded into RT-246.

(c) Rotate SQUELCH selector switch to any OFF position or to any desired squelch (OLD/NEW) position.

(d) On RT-524, rotate SPEAKER switch to OFF position.

(e) Rotate VOLUME control fully clockwise.

(7) Set PWR-RESET/OFF circuit breaker on SDU to RESET position.

(8) On each VHF/UHF-AM radio set perform the following steps:

(a) On the AM-7176, set PWR/OFF circuit breaker to PWR position.

(b) On the AM-7176, set BYPASS/PA switch to one of the following positions:

1 Set to PA position to operate radio set in 30 watt power mode. FAULT lamp on AM-7176 should not be lit.

2 Set to BYPASS position, to operate radio set in 10 watt power mode. FAULT lamp on AM-7176 should be lit.

b. Operating Procedures. Refer to figure 4-4 and table 4-4. The following procedures provide instructions to operate the Radio System using the RSC. Operating procedures for local or remotely deployed RSCs are identical; the only additional requirement for the remotely deployed RSC is to set BATTERY-ON/OFF switch to ON position.

CAUTION

Avoid exposing the Radio Set Control LCD display to bright sunlight for long periods of time. Excessive exposure to sunlight will cause the indicators to white out. Should white out occur, shade the display until condition disappears.

NOTE

To simplify keyboard operations, always depress and release the appropriate OPER key to begin an entry procedure, and the ENT key to end the procedure, or before rotating the RADIO TRANSMIT switch to another position.

(1) HF Radio Set Operation. To operate the HF radio set via the RSC, proceed as follows:

(a) Rotate RADIO TRANSMIT selector switch to HF position.

CAUTION

After entering a frequency, always allow antenna tuner to complete tuning cycle (five seconds maximum), before changing or entering a new frequency.

(b) To enter operating frequency, depress and release keys as follows: OPER key; six number keys (desired frequency digits is sequential order); then ENT key.

NOTE

CLR key clears (erases) displayed frequency one digit at a time, beginning with last digit entered. To change entire frequency, repeat frequency entry procedure.

(c) To select upper or lower sideband, depress and release keys as follows: OPER key; USB or LSB key; then ENT key. Display shows U for upper or L for lower sideband.

(d) To enable squelch, depress and release keys as follows: OPER key; SQL key; then ENT key. Repeat procedure to disable squelch.

NOTE

Squelch mode must be enabled during secure voice operation.

(e) Rotate SQL/VOL control on RT-1444 to adjust for desired squelch level.

(f) Refer to figure 4-4 and table 4-4 for additional RSC control and indicator functions associated with selecting radio set audio at the RSC.

(g) To select COMSEC OVERRIDE depress and release keys as follows: OPER key; 2 key; then ENT key. HF display shows SEC oN (oFF). Press 1 key for COMSEC SCENARIO ON or 0 key for COMSEC OFF (OVERRIDE). Press ENT key.

(h) The COMSEC OVERRIDE option differs from the standard power up COMSEC SCENARIO.

(1) Both RSC's back lighting will be lit for 5 minutes.

(2) On both RSC's, all PT indicators will blink on and off for 5 minutes.

(3) 5 minutes after COMSEC OVERRIDE has been selected, the system returns to the standard power up COMSEC SCENARIO.

(2) VHF-FM Radio Operation. The RSC is capable of providing keyline and audio interface for RT-246 or RT-524. In addition, the RSC provides the capability to select any one of ten preset channel frequencies manually set into RT-246. To select RT-246 preset channel frequencies using the RSC, proceed as follows:

(a) Rotate RADIO TRANSMIT select switch to VHF-FM position.

NOTE

Prior to using the RSC to select a VHF-FM preset frequency, preset channel frequencies must be manually loaded into the RT-246.

(b) To select preset channel frequencies, depress and release keys as follows: OPER key; number keys (desired preset channel number); then ENT key.

(c) Refer to figure 4-4 and table 4-4 for control and indicator functions associated with selecting radio set audio at the RSC.

(3) VHF/UHF-AM Radio Set Operation. To operate the VHF-AM or UHF-AM radio set via the RSC, proceed as follows:

NOTE

VHF-AM radio set frequencies must be between 116.000 and 149.975 MHz. UHF-AM radio set frequencies must be between 225.000 and 399.975 MHz.

(a) Rotate RADIO TRANSMIT selector switch to the VHF-AM or UHF-AM position.

(b) To enter an operating frequency, depress and release keys as follows: OPER key; five number keys (first five digits of desired frequency in sequential order); then ENT key.

NOTE

The sixth number of any frequency will always be 0 or 5. If the fifth number is 2 or 7, the sixth number will be 5. If the fifth number is 5 or 0, the sixth number will be 0. This is an automatic function of the radio set.

(c) To load preset channel frequencies, depress and release keys as follows: OPER key; five number keys (first five digits of desired frequency in sequential order); PST key; number key (digit of preset channel assigned to the frequency); then ENT key. Repeat these procedures to load each of the eight (1 through 8) preset channels.

(d) To select preset channel frequencies, depress and release keys as follows: OPER key; PST key; then the number key (digit of desired preset channel); then ENT key.

(e) To display the frequency of a selected preset channel, depress and release ENT key.

(f) To select direction finding (DF) mode, depress and release keys as follows: OPER key, DF TONE key; then ENT key. Repeat procedure to disable direction finding mode.

NOTE

During DF mode operation, receive functions are disabled.

(g) To select squelch (SQL) mode, depress and release keys as follows: OPER key; SQL key, then ENT key. Repeat procedure to disable squelch mode.

NOTE

Squelch mode must be enabled during secure voice operation.

(h) To select guard mode depress and release keys as follows: OPER key; GD key; then ENT key. Repeat procedure to disable guard mode.

(i) Refer to figure 4-4 and table 4-4 for control and indicator functions associated with selecting radio set audio at the RSC.

(4) 2 or 4 Transmitter Operation. To operate the system in 2 or 4 transmitter mode, proceed as follows:

(a) Rotate RADIO TRANSMIT selector switch to the HF position.

(b) Press OPER key; 0 key; then ENT key. HF display shows n tr = 2 (4).

(c) Press 2 key or 4 key to desired transmit operation, then ENT key.

NOTE

The 2 transmitter mode is automatically selected upon power up.

(5) 1 or 5 minute backlighting mode. To select the 1 or 5 minute backlight mode, proceed as follows:

NOTE

The RSC is powered up in the 1 minute backlight mode.

(a) Rotate RADIO TRANSMIT selector switch to the OFF position.

(b) Press OPER key; 5/ACT key then ENT key.

(c) 5 minute backlight mode is now selected for that particular RSC.

(d) To select 1 minute backlight mode, press OPER key; 1 key then ENT key.

(e) 1 minute backlight mode is now selected for that particular RSC.

c. Shutdown Procedures. Normal shutdown procedures for the Radio System are as follows:

(1) Set POWER ON/OFF circuit breaker on VHF/UHF-AM radio set to OFF position. On Radio Communication System AN/GRC-206(V)1, set associated COMSEC equipment mount POWER ON/OFF switch to OFF position, if enabled.

(2) Set PWR RESET/OFF circuit breaker on SDU to OFF position.

(3) Set POWER selector switch on VHF-FM radio set to OFF position. On Radio Communication System AN/GRC-206(V)1, set associated COMSEC equipment mount POWER ON/OFF switch to OFF position, if enabled.

(4) Set POWER RESET/OFF circuit breaker on HF radio to OFF position. Rotate SQL/VOL control on RT-1444 fully counterclockwise. On Radio Communication System AN/GRC-206(V)1, set associated COMSEC POWER ON/OFF switch to OFF position, if enabled.

(5) Set PWR RESET/OFF circuit breaker on power switchboard to OFF position.

(6) Set BATTERY-ON/OFF switch on RSC to OFF position.

(7) Turn off power at primary power source.

d. Emergency Operation. The following subparagraphs provide the procedures necessary to bypass the RSC/SDU interface and operate either RF subsystem via its' front panel controls. Refer to figure FO-7 to aid in making cable connections.

(1) Local Operation of HF Radio. To operate the HF radio set via its front panel controls, proceed as follows:

(a) Set POWER RESET/OFF circuit breaker on HF radio set to OFF. Also turn off power to associated COMSEC equipment; Radio Communication System AN/GRC-206(V)1 only.

(b) Disconnect cables 4W9 (P2 and P3) and 4W11 (P2) from HF radio.

(c) Connect handset to RT-1444 AUDIO connector, turn power on and perform normal HF radio operating procedures.

(d) For secure voice operation, connect 4W10 between RT-1444 AUDIO and KY-65 RADIO connectors, and connect handset to KY-65 AUDIO connector. Perform normal HF radio operating procedures.

(2) Local Operation of VHF-FM Radio. To operate the VHF-FM radio via its' front panel controls, proceed as follows:

(a) Set POWER selector switch on VHF-FM radio to OFF position.

(b) Disconnect cable 4W15 (P2) from VHF-FM radio REMOTE connector (RT-246 only). Also disconnect 4W19 (P2) or 4W17 (P2) from VHF-FM radio RETRANSMIT R/W connector.

(c) Disconnect cable 4W19 (P3) from VHF-FM radio X-MODE connector. Replace X-MODE connector cover.

(d) Connect handset to RETRANSMIT R/W connector on VHF-FM radio, turn power on and perform normal VHF-FM radio operating procedures.

(e) For secure voice operation, refer to TO 31R2-2VRC-221. (Special equipment is required to operate in the secure voice mode.)

(3) Local Operation of VHF/UHF-AM Radio. To operate the VHF-AM or UHF-AM radio set via its' front panel controls, proceed as follows:

(a) Set PWR/OFF switch on VHF/UHF-AM radio set to OFF position.

(b) Disconnect cable 4W13 (P2) from VHF/UHF-AM radio set REMOTE connector and cable 4W12 (P2) or 4W14 (P2) from VHF/UHF-AM radio set AUDIO connector.

(c) Connect handset to VHF/UHF-AM radio set AUDIO connector, turn power on and perform normal VHF/UHF-AM radio set operating procedures.

(d) For secure voice operation, connect 4W14 between VHF/UHF-AM radio set AUDIO connector and the KY-57 RADIO connector, disconnect 4W12 (P2) and connect handset to KY-57 AUDIO connector. Perform normal VHF/UHF-AM radio set operating procedures.

Section II. FUNCTIONAL SYSTEM OPERATION

4-11. GENERAL. This section contains a brief functional block diagram description of the Radio System. The discussion is based upon figure 4-8. To supplement the information in this section, refer to chapter 1. Figure 1-3 shows the Radio System component locations, and table 1-4 lists the capabilities and limitations of the equipment. Table 1-5 lists the equipment supplied with the Radio System and gives brief information on the equipment function.

4-12. RADIO SYSTEM FUNCTIONAL DESCRIPTION. The Radio System consists of the following equipment: A power switchboard which selects and distributes primary power for use by Radio System components; a signal distribution unit (SDU) which processes and controls the flow of information between the radio sets and the radio set controls; two radio set controls (RSCs) which provide operator interface and control of the entire Radio System; and four radio sets (and associated antennas) which provide receive and transmit capabilities in three communication bands (HF, VHF, and UHF). In addition, voice ciphering equipment may be connected in the audio path of either radio set to provide secure voice operation of the associated radio set. The following paragraphs provide a functional description of the Radio System major components.

NOTE

The capability for secure voice operation is available on Radio Communication System AN/GRC-206(V)1 only.

a. Power Distribution. Primary power for the electronic equipment in the Radio System is generated by one of two supplies. One is the vehicle power generating system and the other is a gasoline engine generator. Primary power is routed to the power switchboard via two separate power cables. At the power switchboard, source power is selected and conditioned for distribution. The conditioned power is distributed via a power junction unit which is hard mounted to the rear of the power switchboard mount. Separate power cables from the power junction unit (PJU) distributes the conditioned +28 Vdc power to each LRU installed in the equipment mounting rack.

b. RSC-SDU Interface. Control of the entire Radio System (in the normal mode of operation) is accomplished via the RSC-SDU interface which consists of the signal distribution unit (SDU), fiber optic (F/O) cables, and one or two radio set controls (RSCs). Two RSC's are supplied with each Radio System to provide audio and control input-output capabilities in either of the following configurations: one operator at either or both RSC's; or two operators at either or both RSC's.

(1) Transmit Operation. During transmit operation, digitized audio and control information for the selected rf subsystem is routed from the RSC to the SDU via the transmit (XMT) line of the F/O cable. The information received by the SDU is decoded and processed for output to the selected rf subsystem as conventional control and audio signals. The control and audio signals are routed from the SDU to the appropriate radio set via separate control and audio cables.

(2) Receive Operation. During receive operation, audio signals from the receiving radio set is routed to the SDU. The audio signal received by the SDU is digitized and coded for output to the RSC. The coded information is routed from the SDU to the RSC via the receive (RCV) line of the F/O cable. The information received by the RSC is decoded and routed to the appropriate front panel audio connector, display or fault indicator.

c. HF Radio Set Operation. The HF radio set is composed of two major components; Receiver-Transmitter RT-1444/URC (RT-1444), and Amplifier-Coupler AM-7148/GRC-206 (AM-7148). The HF radio set provides HF-SSB communications between 2.0 to 29.999 MHz and operates on any one of 280,000 frequency channels. The RT-1444/URC is a modified RT-1209/URC. The RT-1444 provides rf drive, frequency selection, operating mode selection, and power on/off control. The AM-7148 basically provides

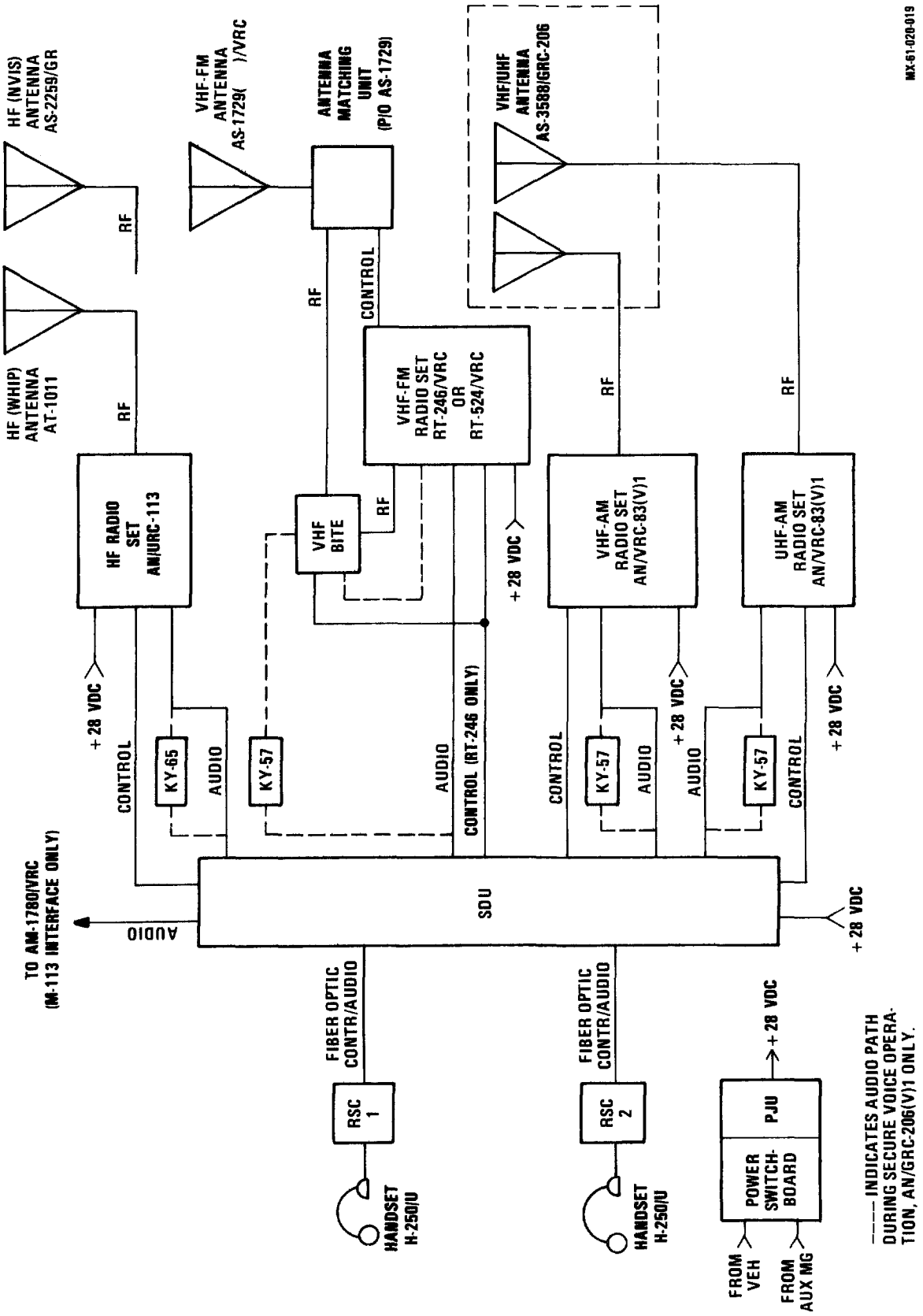


Figure 4-8. Radio System Simplified Block Diagram

amplification for HF transmission signals and automatic tuning of the installed antenna to impedance match the 50 ohm resistive output of the power amplifier. The AM-7148 also provides fault sensing with a display circuit to visually indicate the unit/assemblies causing failures.

(1) Transmit Operation. Transmit operation is started by a PTT signal that originates from the handset. During transmit operation, the audio and PTT signal from the SDU (KY-65 during secure voice transmissions) is routed to the front panel AUDIO connector on the RT-1444. The RT-1444 produces an HF-SSB drive input up to 157 milliwatts. This drive is amplified to a peak power of 150 watts by amplifiers within the AM-7148. This rf signal is coupled to the antenna through the low pass filter assembly to the antenna tuner assembly. A discriminator assembly circuits provide dc analog signals to a control logic assembly that controls antenna tuning sequence and impedance matching to the antenna. These dc analog signals are developed from magnitude and phase angle relationships of the rf voltage and current monitors.

NOTE

If any fault is detected in the HF radio set a visual fault indication and audible alarm (intermittent two tone signal) will be present at the RSC.

(2) Receive Operation. The radio subsystem is in the receive mode at any time the PTT signal is not present. During receive operation the T/R relay in the low pass filter assembly is in the receive position and signals at the antenna are coupled to the RT-1444 through the antenna tuner assembly. The RT-1444 demodulates the RCV rf and converts it to RCV audio. The RCV audio is applied to an audio filter to the audio amplifier circuitry. This amplified audio is routed to the front panel AUDIO connector. The RCV audio is routed from the RT-1444 to the SDU (KY-65 during secure voice reception) for output to the RSC and to the front panel of the AM-7148 for application to the local speaker.

d. VHF-FM Radio Set Operation. RT-246/VRC or RT-524/VRC is used to provide VHF-FM communications between 30.00 to 75.95 MHz and operates on any one of 920 frequency channels. The receive and transmit audio paths are identical from both receiver-transmitters. A VHF-FM detect circuit is used to sense the type VHF-FM radio installed in the Radio System. This signal is used by the RSC-SDU interface to provide the appropriate RSC display and control functions during VHF-FM operations.

(1) Transmit Operation. During transmit operation, XMT audio signals are routed from the SDU (VHF BITE during secure voice operation) and applied to the front panel RETRANSMIT R/W connector. The XMT rf from the receiver-transmitter (RT) is routed to the VHF BITE panel which monitors the RTs rf output power for losses greater than 3 dB. The XMT rf is then routed to the VHF-FM antenna.

NOTE

If the rf output from the transmitter drops below a specified level, a fault indication will be present at the RSC.

(2) Receive Operation. During receive operation, the RCV rf is routed from the antenna through the VHF BITE panel to the RT. During nonsecure voice operation, the RCV audio signal from the RT is routed to the SDU. During secure voice operation, the RCV audio signal from the RT is routed through the VHF BITE and applied to voice ciphering equipment (KY-57), then routed to the SDU.

e. VHF/UHF-AM Radio Set Operation. Radio set AN/VRC-83(V)1 is used to provide VHF/UHF-AM communications for the Radio System. The VHF-AM radio set provides communications between 116.000 to 149.975 MHz and operates on any one of 1360 frequency channels. The UHF-AM radio set provides communications between 225.000 to 399.975 MHz and operates on any one of 7000 frequency channels. The UHF-AM radio set is also capable of guard receiver operation at the input frequency of 243.000 MHz. Refer to TO 31R2-2VRC83-2 for the detail description of radio set AN/VRC-83(V)1. The receive and transmit signal paths are similar for both AN/VRC-83(V)1 applications in the Radio System, therefore only one description is given.

(1) Transmit Operation. During transmit operation, XMT audio signals are routed from the SDU (KY-57, during secure voice operation) and applied to the RT-1319 AUDIO connector. The XMT rf from the RT-1319 is applied to the AM-7176 which is capable of amplifying the rf to 30 watts when its front panel switch is in the PA position. Regardless to the selected rf power output, the XMT rf is routed from the AM-7176 and applied to the appropriate (UHF or VHF) port on the UHF/VHF antenna.

NOTE

If the rf output from the transmitter drops below a specified level, a fault indication will be present at the RSC.

(2) Receive Operation. During receive operation, the RCV rf is routed from the associated UHF/VHF antenna port and applied to AM-7176 ANT connector. The RCV rf is then routed from the AM-7176 to the RT-1319 ANT connector. Internal to the RT-1319, the intelligence is removed from the rf signal and routed from the RT-1319 AUDIO connector as RCV audio. The RCV audio is then routed to the SDU (KY-57 during secure voice receptions).

Section III. FUNCTIONAL OPERATION OF ELECTRONIC CIRCUITS

4-13. SCOPE. This section describes the operation of electronic components that are unique to the Radio System. Electronic circuit described are; the power switchboard, SDU, RSC, VHF BITE panel, amplifier-coupler AM-7148, and the RT-1209 remote control module. Descriptions of electronic circuits within other components (AN/VRC-83(V)1, RT-524/RT-246, RT-1209/URC) of the Radio System are contained in the related technical manuals listed in Chapter 1. (Except for the remote control module, which is described in this Section, the theory of operation for an unmodified RT-1209/URC and the RT-1444/URC receiver-exciter is the same.)

4-14. POWER SWITCHBOARD CIRCUITS. The power switchboard contains the circuitry necessary to provide protection against transient voltage spikes and overvoltage conditions. In addition it provides isolation between input voltages from two separate power sources. See figure FO-11 for schematic diagram of power switchboard SB-4151.

a. Input Power. Input power to the power switchboard is +22.5 to +30.0 Vdc and is supplied by the vehicle electrical system, or an auxiliary motor generator. Connection to the power switchboard is via input power connectors J4 and J5. Power selector switch S1 is used to select input power from either of the two sources. Power selected by S1 is applied to CB1 and CR1, which provides protection against reversed polarity, sustained overvoltage (>36V) and turns power to Radio System components on or off. When CB1 is reset and a functioning power source is selected by S1, power lamp DS1 (green lens) lights and the input voltage level is indicated on meter M1. CR2 and CR3 are steering diodes which provide isolation between input voltage sources and act as fuses for loads connected to J3. CR5 provides overcurrent protection and transient suppression, it limits transient voltages to 51V maximum. Power available at the accessory connectors (J1 and J2) and binding post is controlled by CB2, CB3, and S1.

b. Power Source Selection. Power source selection is accomplished with S1 and K1. When S1 is in AUX MOTOR GEN position, K1 is deenergized. Input voltage from connector J5 is routed to connector J6. When S1 is in VEHICLE position, K1 is controlled by the RUN/RUN# input at J4-D. When RUN is present at J4-D, K1 coil is energized making contact A1-A2. Input voltage from connector J4 is routed to connector J6. When RUN# is present at J4-D, K1 coil is deenergized, making contact A3-A4 which inhibits routing of vehicle power. When S1 is in the VEHICLE OVERRIDE position, K1 coil is energized making contact A1-A2. Input voltage from connector J4 is routed to connector J6. In this position, vehicle override lamp DS2 (amber lens) lights to indicate that power to the Radio System is being supported by the vehicles battery.

4-15. SDU FUNCTIONAL OPERATION. The SDU is designed around a microprocessor. The processor architecture is defined to include bidirectional I/O ports, RAM, and ROM. All control/monitor/command functions pass through the microprocessor. All audio routing, multiplexing, and demultiplexing is accomplished by hardwired discrete logic operations under microprocessor control. The SDU (microprocessor) accomplishes its tasks via two operating modes.

a. SDU Initilization Mode. When power is enabled to the SDU circuits, the microprocessor enters an initialization mode. During this mode, all transmit key lines are disabled, all delays are established, and a valid control word is sent to each subsystem (radio set). This control word prevents any problems that may re-

sult from a false control word being applied to a radio subsystem. Upon completion of the initialization functions, the SDU transfers to the run mode (run state).

b. SDU Run State. The SDU run state consists of a continuous series of functions that are subsets of the run state. The SDU recognizes the following subsets of the run state.

(1) Monitor Status. During monitor status, the microprocessor collects data concerning the electrical and physical configuration/status of the total Radio System. Monitor status contains subset functions of: Built-in-Test Equipment (BITE) status, clear/secure status of system, receiver status, and system configuration.

(2) RSC Status/Data. The RSC supplies operational action data to the SDU via the RSC status/data subset. This data is stored and executed by the microprocessor. RSC status/data contains subset functions of: bit error rate (BER) compensation replies, and radio select/control functions which consist of the following subsets; key lines, transmit audio, frequency/channel commands, and mode information.

(3) Link Maintenance and COMSEC Scenario. This run subset establishes the real time control of the total Radio System. It controls operators and equipments to eliminate possible compromising of the crypto devices or secure information (AN/GRC-206(V)1), during transmission by the Radio Set. The scenario subset consists of internal status, timing, user conflict resolution with subsets of system conflicts, operator conflicts and a COMSEC OVERRIDE SCENARIO.

(4) SDU Data to the RSC. This subset of the run state supplies all system status/data to the RSC for display/interface with the operator. This function consists of the following subsets: entered commands, system status, and operating frequencies.

(5) Subsystem Control Data. This subset includes all data supplied to the Radio System subsystems. This function consists of: valid frequency control data, and transmit key control.

(6) Signal Routing and Control. This subset consists of all internal SDU routing scenarios. This function consists of: transmit audio, receive audio, intercom audio, multiplex data link control, and command and control execution.

4-16. SDU CIRCUITS. Refer to figure FO-17. The SDU consists of audio interface (1) CCA A1, audio interface (2) CCA A2, red interface CCA A3, black interface CCA A4, CPU CCA A5, power supply CCA A6, motherboard CCA A7, fiber optic module A8, fiber optic module A9, and a case assembly. Some integrated circuits (ICs) which are used on several CCAs within the SDU are: universal asynchronous receiver/transmitters (UARTs), universal synchronous asynchronous receiver/transmitters (USARTs), contin-uously variable slope delta modulator/demodulator (CVSD converters), and analog multiplexers/demultiplexers (analog switches). These ICs will be referenced throughout the SDU circuit discussion by their abbreviated form.

a. Audio Interface (1) Circuits. Audio interface (1) CCA A1 provides interface for RSC1 and RSC2 fiber optic links. It also provides audio routing for the VHF-AM and UHF-AM subsystems, and contains timing circuits to clock on board CVSD converters and UARTs. Audio interface (1) circuits include two UARTs, four CVSD converters, five analog switches, a 3.2 MHz crystal oscillator, and various control, filter and protection circuits. One UART is used to interface RSC1 and the other UART is used to interface RSC2. These UARTs provide the necessary formatting and

control for interfacing between the serial data required for fiber optic transmissions and the parallel data required for circuitry internal to the SDU. The CVSD converters are used to provide analog-to-digital (A/D) and digital-to-analog (D/A) conversions of the UHF-AM and VHF-AM audio signals. In addition, two of the CVSD converters provide D/A conversion of the digitized equivalent of the intercom analog audio signal when a PSC-2 is operated from the DATA port of the RSC. The analog switches form part of a switching matrix used to route audio, timing, and control signals to selected designations. Audio interface (1) also contains an intercommunication (IC) circuit using an audio isolation transformer with balanced output. This additional isolation is necessary because the IC audio line is routed outside the Radio System to the VIC-1 intercom (M-113 vehicle only). All audio signals and key lines for the five subsystems (HF, VHF-FM, VHF-AM, UHF-AM and IC) are interfaced through connector J1. Connectors J2 and J3 provides the interface for RSC2 and RSC1, respectively, via the associated fiber optic module.

b. Audio Interface (2) Circuits. Audio interface (2) CCA A2 provides subsystem decoding and switch matrix control. It also provides audio routing for VHF-FM, HF-SSB, and IC subsystems. Audio interface (2) circuits include a UART, a 4-to-16 line decoder, six CVSD converters, six analog switches, and various control, filter and protection circuits. The UART is used to receive serial audio control data from red interface CCA A3 and output eight parallel data lines: four of the data lines are inputs to three 4-bit latches on this assembly and two 4-bit latches on audio interface (1); the other four data lines are inputs to a 4-to-16 line decoder which supplies clock signals for the latches on this assembly, and strobe signals (strobe 1 and 2) to the latches on CCA A1. The output of the latches are used to inhibit or control select lines of the analog switches. The six CVSD converters are used for D/A and A/D conversion of the HF-SSB, VHF-FM, and IC subsystem audio signals. In addition to supplying parallel data for switch matrix control the UART outputs serial audio control data back to the red interface assembly for verification and system (software) status update.

c. Red Interface Circuits. Red interface CCA A3 provides status monitoring and control for the VHF-AM and UHF-AM subsystems. It also provides control and monitoring of data and audio routing to the RSCs and subsystems. Red interface circuits include a programmable peripheral interface, two 8-bit shift/storage registers, three USARTs, a 3-to-8 line decoder, and the necessary input/output (I/O) circuits. The peripherial interface and USARTs are interfaced to the processor via a bidirectional data port. The programmable peripheral interface is used to continuously monitor the status of the VHF-AM and UHF-AM subsystems and upon command by the processor, provide frequency change, PTT, and data available inputs to those subsystems. Status conditions monitored by the peripheral interface are BITE fault, clear/secure indicate, squelch indicate and PTT indicate. Serial data from the VHF-AM and UHF-AM subsystems is input to an 8-bit shift/storage register (one for each of the two subsystems). This serial data is accompanied by data clock and data load inputs from the subsystem. The data clock input is used to clock the serial data into the shift register, and the data load input (INTERRUPT 2, VHF-AM; INTERRUPT 3, UHF-AM) informs the processor via a peripheral interface controller, that data is available from the subsystem. The eight parallel data lines from the shift register are connected to the bidirectional data port which is accessed by both the programmable peripheral interface and the processor. The three USARTs are used as peripherals for the processor. They provide the communication interface between the processor and audio interface (1) and (2) CCAs. One USART outputs serial audio control data to the UART on audio interface (2) CCA. This serial audio control data is used by the UART for switch matrix control and subsystem

decoding. The other two USARTs output serial operator command transmit data to the UARTs on audio interface (1) CCA. As with the UARTs on audio interface (1) CCA, one USART is used to provide data for RSC1 and the other provides data for RSC2. This serial (RSC1 or RSC2) operator command transmit data from the USART, provides its associated UART (on CCA A1) with subsystem select data and the appropriate go-no go command depending on subsystem status and Radio System configuration. A 3-to-8 line decoder, under processor control, is used to enable the appropriate peripheral (USART, 8-bit storage/shift register, or programmable peripheral interface) for communication. Each USART has two interrupt lines which interface the processor via a peripheral interface controller located on the CPU CCA A5. These lines (INTERRUPTS 0, 1, 5, 6, 7 and 9) inform the processor when its associated USART has data available for output, or is available to receive data. No interrupts are generated by the programmable peripheral interface since the VHF-AM and UHF-AM subsystems provide their own data load signals (INTERRUPTS 2 and 3) to the processor, and data already latched into the peripheral interface is available to the processor on request. All data/status signals received from the VHF-AM and UHF-AM subsystems are input via comparators. VHF-AM and UHF-AM signals are outputted via darlington drive circuits. This assembly also contains shunt regulators to provide red power to requiring circuits.

d. Black Interface Circuits. Black interface CCA A4 provides status monitoring and control for the HF-SSB and VHF-FM subsystems. Black interface circuits include two programmable peripheral interfaces, a 512-bit electrically alterable ROM (EAROM), an octal transceiver, a USART, and various timing and I/O circuits. The programmable peripheral interfaces and USART are interfaced to the processor via a bidirectional data port. One peripheral interface is used to continuously monitor the status of the HF-SSB and VHF-FM subsystems and upon command by the processor, provide preset channel (CH1 - CH10) select data to the VHF-FM subsystem (subsystems employing RT-246, only). Status conditions monitored by this peripheral interface are; tune-in-progress (TIP), power amplifier BITE, VHF BITE, KY/KY #, and RT-246 detect. The octal transceiver consists of two 8-bit parallel I/O ports and is used as a bidirectional data bus between a programmable peripheral interface and an EAROM. Together, these three devices assist the processor in performing command and control functions on action data received from the RSC. These devices under processor control, allow action data from the RSC to be temporarily stored, changed, or updated, while at the same time supplying the data back to the active RSC for display and operator interface. Once the enter key is depressed on the active RSC, the processor executes the enter command by updating the appropriate subsystem and both RSC1 and RSC2 displays. A USART is used as the communication interface for the HF-SSB subsystem. RT-1444 serial status information is transmitted to the SDU front panel in complementary form for maximum noise immunity, and converted to single-ended form by data I/O circuits. The single-ended data words are fed to the USART which flags (INTERRUPT 4) the processor indicating that data has been received from the subsystem for output to the processor. Once serviced by the processor, the USART again flags (INTERRUPT 8) the processor indicating it is available to receive data. The processor inputs control data to the USART via the bidirectional bus. The USART then under control of the processor, outputs single-ended control data to the data I/O circuits. Timing circuits contained on this assembly generate the RT-1444 clock signal for output by the data I/O circuits. The data I/O circuits converts the single-ended control data and associated clock signals to complementary form for output to the subsystem.

e. CPU Circuits. CPU CCA A5 provides the means to control all functions of the Radio System. The major functions controlled are; monitor of system status, audio

routing, command and control, operator conflict resolution, communication security scenario, bit error rate compensation, and multiplexer control. These functions are controlled by the microprocessor resident on this CCA. CPU circuits include an 8-bit microprocessor (processor), two programmable interrupt controllers, three 3-to-8 line decoders, four 4096 x 8-bit EPROMs, eight 1024 x 4-bit RAMs, a 4 MHz oscillator, an octal buffer, and various gating and I/O circuits. External timing for the processor is provided by the 4 MHz oscillator which supplies an input frequency twice the internal operating frequency of processor. The processor has internal clock generation and supplies a 2 MHz clock signal to the red and black interface CCAs for system control. The processor has an 8-bit unidirectional address bus and a bidirectional 8-bit data/address bus. The 8-bit (octal) buffer is used to provide a high speed, high current interface between the processors 8-bit address bus, select lines of the three decoders, and address select lines of the EPROMs. The decoders are used to provide chip enable signals to the RAMs, EPROMs, and interrupt controllers on this assembly, and to the peripheral interfaces and UART on black interface CCA A4. Two programmable interrupt controllers are used to process subsystem interrupt flags from the red and black interface assemblies, and resolve interrupt priorities using programmable algorithms controlled by the processor. Once interrupt priorities are established, the processor instructs the interrupt controller to place its preprogrammed interrupt vector address of the selected interrupt onto the data bus. The processor then communicates with the selected devices via the bidirectional data bus. All data received from the selected device is verified by the processor against data stored in memory (EPROMs and RAM). The EPROMs store preprogrammed data which includes all allowable operating scenarios and system configurations, command and control instruction formats, and data necessary to provide RSC to SDU bit error rate (BER) compensation. The RAMs provide storage of active or pending data when the Radio System is in use. This data includes active operating configurations of the system, subsystem, and RSCs. An octal latch/register is interfaced to the data/address bus of the processor, and is used to latch address data from the processor to the enabled EPROM or RAM.

f. Power Supply Circuits. Power supply CCA A6 supplies conditioned power to CCAs within the SDU. It develops black power only for the related circuits in the SDU. SDU circuits requiring red power have additional shunt regulation circuits to meet their requirements. Power supply circuits include two hybrid switching regulator ICs, two regulating pulse width modulator ICs, a +12V regulator IC, a +9V regulator IC, and various L-C filter circuits. The power supply contains the necessary protection for transients that may not be completely attenuated by the Power Switchboard SB-4151. The power supply receives +28V from the power switchboard and supplies +12V, +17V, +9V, +5V, and -29V to requiring SDU CCAs. The power supply also supplies conditioned power (+17.5V) for use by the local RSC.

g. Fiber Optic Module Circuits. Fiber optic modules A8 and A9 are identical, therefore only one description is necessary. The fiber optic (F/O) module consists of F/O transmitter CCA A1, F/O receiver CCA A2, F/O bulkhead connector, an interface connector, and the F/O module cover. The F/O module provides digital-to-optic and optic-to-digital conversion of communication signals (both audio and control) between the SDU and RSC. The F/O module is capable of full-duplex operation via independent receive and transmit circuits, and a 2-channel fiber optic link (F/O cable). The F/O module can operate from F/O cable lengths of 6 meters to 3.3 kilometers. The F/O module receiver/transmitter (driver) circuits operate at a data rate of 200 kbps. Supply voltage required for these circuits is +8 to +12 Vdc. Maximum supply current required for transmit and receive operations is 250 mA and 70 mA, respectively. Input/output (I/O) signals, between the F/O bulkhead

connector and the receiver/driver circuits, are optically coupled via F/O pigtails. I/O data between the F/O module and SDU audio interface (1) CCA is CMOS compatible and is routed through the F/O module interface connector.

(1) F/O Transmitter CCA A1. F/O transmitter (driver) CCA A1 includes a light-emitting diode (LED) source, and a current driver. The LED source is optically coupled into a F/O pigtail which is connected to the transmit terminus of the F/O bulkhead connector. The driver current required for the LED source is approximately 100 mA. This current is switched by a nonreturn to zero (NRZ) data signal.

(2) F/O Receiver CCA A2. F/O receiver CCA A2 includes a photo diode sensor (sensor), a two-stage amplifier section and a comparator circuit. The sensor is optically coupled into a F/O pigtail which is connected to the receive terminus of the F/O bulkhead connector. The sensor output is coupled to the two-stage amplifier section which raises the output of the low-level source. The amplified signal is then applied to the comparator circuit which outputs the receive signal at a level compatible to the CMOS circuitry internal to the SDU.

4-17. HF-SSB CIRCUITS. Radio set AN/URC-113 consists of RT-1444 and amplifier-coupler AM-7148. The following paragraphs provide theory of operation for the RT-1444 remote control module and amplifier-coupler AM-7148. Refer to TO 31R2-2PRC104-2 for a description of of the theory of operation of the RT-1209 portion of the RT-1444/URC.

4-18. REMOTE CONTROL MODULE CIRCUITS. The RT-1209/URC (RT-1209) is controlled by hard-wired, parallel-format, binary data, normally generated by the front panel controls and received through a 51-pin connector at the front of its main body. Refer to figure 4-9. For applications within the Radio System, the RT-1209 modification module (remote control module) is installed between the RT-1209 main body and control panel. The remote control module supplies the control data, in the basic RT-1209 format, to the 51-pin connector when operating in both the remote control mode (control via the RSC/SDU interface) and the local (front panel) mode. The remote control module has three circuit card assemblies (CCA); panel interface CCA A1, SDU interface CCA A2, and RT interface CCA A3. The remote control module contains all the circuitry necessary to add remote control and receiver squelch capabilities to the receiver-exciter and still permit normal local-control capabilities of the receiver-exciter with exception of CW keying operation. Connector J1 of the remote control module interconnects to the Radio System SDU by cable 4W9.

a. Remote Control Operation. When interconnected to the SDU, a ground is present at the REMOTE SELECT line (J1-R). This ground disables the data switches in panel interface CCA A1 and control data inputs from the front panel are inhibited. RT-1444 control data (serial data words) from the RSC/SDU interface may then be input to the remote control module via pins E and F of J1.

(1) Data Word Format. Each data word consists of a start bit, four BCD address bits, four data bits, a parity bit and a stop bit (11 bits in all). The data words and their associated clock signal (pins L and M of J1) are transmitted from the SDU in complementary form and converted to single-ended form by the data I/O circuits on SDU interface CCA A2. The single-ended data words and clock signals are fed to a universal asynchronous receiver/transmitter (UART).

(2) UART Data Formating. The UART performs a parity check on the data word. If there is a parity error, the UART signals the SDU to retransmit the data word by transmitting a serial data word (RT-1444 STATUS/ STATUS #) through the data output circuits (pins J and K of J1). If there is no parity error, the UART formats the data and outputs 8-lines of parallel control data. The UART data outputs are; the four BCD address bits that are converted to a 4-line parallel hexadecimal input for a 4-bit latch/1-of-16 line decoder; the four data bits that are converted to a 4-line parallel input for 4 dual 4-bit latches.

(3) UART Output. The eight parallel lines from the UART are routed to RT interface CCA A3. The 4-line parallel input to the 4 dual 4-bit latches (data switches) provides control data (frequency and band selection) for output to RT-1444 main body when the appropriate latches are enabled. The 1-of-16 decoder furnishes an enable (clock) signal to the data switch corresponding to the address of the word in the UART, causing the switch to latch the data present on the data bus at that time. The data switch sends these four elements of data to the RT-1444 main body. (Two of the data switches output only two lines to the RT-1444 main body the other two lines are used internally in the remote control module.) The RT-1444 is thus controlled by the data latched into the data switches. Each time a change is made in a control function, the SDU transmits the appropriate new data word(s) to the UART, which latches the new data into the corresponding data switch or switches.

b. Receiver Squelch Operation. Squelch operation is not a function of the RT-1209. It is a feature added by modifying the RT-1209 with the remote control module circuits. When the remote control module and Receiver-Exciter RT-1209/URC are combined, the assembly is nomenclatured RT-1444/URC. The RT-1444 front panel volume control is used as the squelch sensitivity control when the remote control module is activated for remote control via the RSC/SDU interface. (When the RT-1444 is remotely controlled, receiver volume is controlled by the RSC.) This is accomplished by a volume/squelch control selector newtork operated by digitally control analog switches and fixed resistors on CCA A1. When ground is present at J1-R, the network connects the volume control to the squelch circuitry and sets the receiver audio gain to a level set by the fixed resistors. When J1-R is not grounded, the network connects the volume control in normal fashion to the receiver audio circuits.

(1) Closed Squelch Operation. The CCA A2 squelch circuitry receives an audio output adjusted by the front panel control (POT WIPER). The audio output is sampled by a 2000 Hz low-pass filter and a 2100 to 3500 Hz bandpass filter. The outputs of the filters are rectified and filtered to dc voltages proportional to the average power in each portion of the audio spectrum. These voltages are fed to a comparator that controls audio gating. When the voltages are equal (no receive signal), the gate is closed and the audio output is inhibited (receiver is squelched).

(2) Open Squelch Operation. When a voice signal is received, the spectral distribution is such that the output of the low-pass channel increases with respect to that of the bandpass channel. This unbalances the comparator circuit and causes the audio squelch gate to open and unsquelch the receiver. The digital squelch gate output from the comparator is fed to the UART, which formats it into the serial data out word to the SDU (pins J and K of J1). The SDU processes this information to provide the required CALL indication at the RSC.

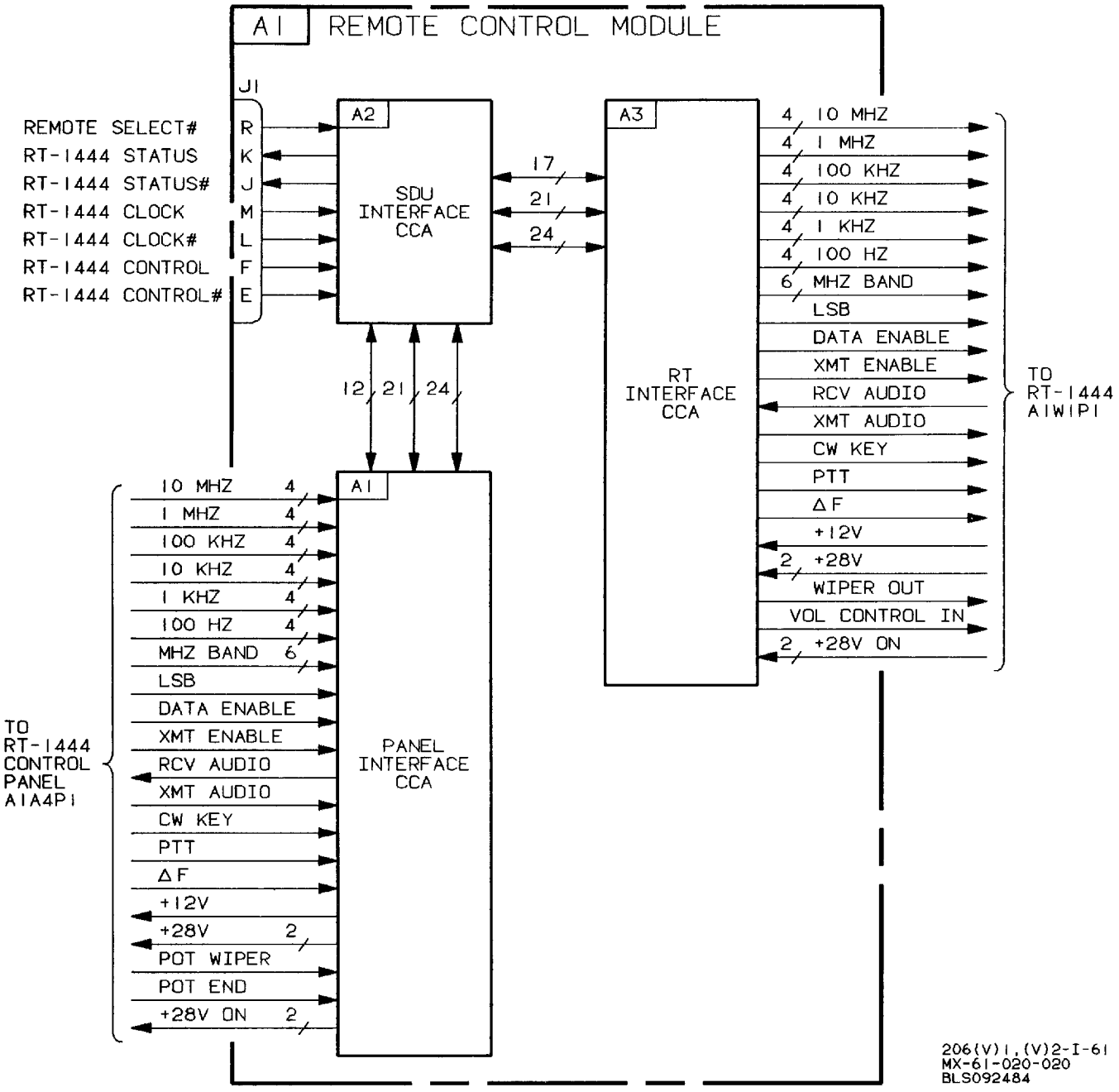


Figure 4-9. Remote Control Module Simplified Block Diagram

4-19. AMPLIFIER-COUPLER CIRCUITS. The AM-7148 consists of power amplifier A1A1, antenna tuner assembly A2, low pass filter assembly A3, control logic assembly A4, and upper electrical equipment chassis A5. Refer to figure FO-14. Power amplifier A1A1 is a subassembly of the lower electrical equipment chassis A1. Discriminator A2A1 is a subassembly of the antenna tuner assembly A2. Microprocessor A4A1 and control logic card A4A2 form the control logic assembly A4. Display card A5A1, interface filter box A5A2, audio amplifier A5A3, and power conditioner A5A4 are all subassemblies of the upper electrical equipment chassis A5.

a. Power Amplifier A1A1. Circuits of the power amplifier include an input resistor and attenuator, four stages of broadband rf amplification, and various control and protection circuits. Rf excitation from the RT-1444 is applied to the AM-7148 and is amplified as follows:

(1) Input Attenuator. The input resistor establishes a constant input impedance. The input attenuator, controlled by protection control circuits, reduce the input signal to limit PA output in the event of ALC failure. The attenuator limits output transistor dissipation current in the event of an open or shorted load, or an open or shorted ALC line, and reduces output power for automatic antenna tuner tuning or an overtemperature condition.

(2) First Amplifier State. The first (input) amplifier stage provides isolation from the 50-ohm input and provides a flat gain response across the frequency range. The input amplifier stage drives the second amplifier (predriver) stage.

(3) Predriver/Driver Stages. The predriver stage provides additional amplification for the third amplifier (driver) stage. The driver stage provides approximately 16 watts of rf drive for the final stage. A RCL interstage network compensates for transistor gain variations that occur over the 2-30 MHz frequency range.

(4) Fourth Amplifier Stage. The function of the fourth (final) push-pull amplifier stage is to generate power. The push-pull configuration has an additional advantage of even order harmonic attenuation. A control current developed from the collector, that is analog to the gain of the stage, is routed to the control logic subassembly. The protecton circuits are located on the control logic assembly (A4) and perform an integral function in power amplifier operation.

(5) Automatic Level Control. A voltage (COLL CUR ANLG), analog of the final amplifier collector current, is compared with other operating parameters (reflected and forward power and collector voltage) to develop an automatic level control (ALC) voltage. This ALC voltage is returned to the GAIN CONT ATTEN and is used to set the amount of RF drive from the exciter to the first amplifier stage.

b. Low Pass Filter Assembly A3. The power amplifier A1A1 output is through a coaxial cable to low pass filter A3. The low pass filter input circuit includes a resistive power attenuation device that is operated into the circuit during tune operation. The pad serves to reduce the amount of RF into the filter network while tuning is accomplished. The low pass filter circuit uses seven 1/2-octave filter bands to cover the required frequency range. The filter bands are switched by sealed relays controlled by digital signals from control logic assembly A4.

c. Discriminator Assembly A2A1. The discriminator is used to sense magnitude and phase angle relationship of the rf voltage and current at the input of antenna tuner assembly A2. Circuits in the discriminator develop five analog dc voltages

as shown in figure FO-14. These five analog dc voltages are applied to control logic assembly A4.

d. Antenna Tuner Assembly A2. Impedance matching of the antenna to the amplifier output is through a T-section matching network in antenna tuner assembly A2. The elements, schematically shown as L1, L2A, L2B, and C1, are actually multiple components that are switched in or out of the circuit by high-voltage vacuum relays. (Also not shown on FO-14, is a static drain resistor that bleeds to ground any charge which may build-up on the antenna system.) This relay operation is controlled by control logic assembly A4 that selects the appropriate combination of coils and capacitors during the tune sequence. The state of these relays is set through logic events that occur in A4A2. The position of the 50 OHM/ANTENNA switch on the front panel of the amplifier-coupler sets a logic state of A4A2 components that determine whether RF is applied to the front panel 50 OHM BNC connector or to components of antenna tuner assembly A2.

(1) Fault Protection. The antenna tuner provides two dc outputs (RF current and RF voltage) to the protection circuits contained within the control logic subassembly A4A2. A fault condition detected by the rf voltage detector disables the power amplifier. The rf current detector is used to hold average power output to a safe level.

(2) Antenna Tuning. Selection of components tunes the antenna to 50 ohms resistive when the coupler is initialized by a TUNE START pulse from the RT-1444 to the input detectors. When installed in the radio system, tuning occurs when the PTT key line goes low at the RSC, or when a frequency is entered and the ENT key of the RSC is pressed. This pulse is also initiated when the front panel MONITOR/TEST selector switch is placed in the MODULE TEST position. When not interfaced through the SDU, receive tuning of the coupler and synthesizer occurs whenever a front panel frequency selection switch is operated to a new position. Transmit tuning, in this stand alone configuration, occurs whenever the PTT key line is activated. The frequency to which the antenna tunes is determined by binary-coded-decimal (BCD) data input at the control logic assembly A4A2.

4-20. CONTROL LOGIC ASSEMBLY A4. The control logic assembly A4 (refer to figure FO-14) consists of control logic card A4A2 and microprocessor circuit card A4A1. This assembly receives frequency and mode data from the RT-1444 and fault monitoring/control data from circuits within the AM-7148. This data is processed and interpreted to provide control of all functions of the amplifier-coupler. Functions controlled by the A4 assembly are; antenna coupler tuning, transmit/receive selection, amplifier ALC/fault protection, and data for the front panel TEST/MONITOR display.

a. Control Logic Card A4A2. Control logic card A4A2 provides the interface to the microprocessor for data received from the RT-1444 and fault monitor signals produced by circuits within the AM-7148. Data input from the RT-1444 includes binary-coded-decimal (BCD) data with frequency information, tune start, antenna bypass, and the key line. The key line input is parallel routed to the audio amplifier as a muting signal.

(1) Input Detectors. Signals from the RT-1444, discriminator assembly A2A1, power amplifier A1A1, and antenna tuner assembly A2 are converted to digital logic levels (where required) and buffered by a group of input detectors. The majority of the buffered inputs are supplied to microprocessor circuit card A4A1 for pro-

cessing, while others are used on control logic circuit card A4A2. The frequency select information from the RT-1444 (RSC/SDU interface with the Radio System) is used to operate the input and output band select relays of low pass filter assembly A3.

(2) Power Amplifier Control Ciruit. The power amplifier protection circuits on control logic circuit card A4A2, function in conjunction with input controls and monitor signals from other assemblies. The functions of this circuit are interfaced and controlled by microprocessor circuit card A4A1 via the control, address and data bus. The power amplifier control circuits produces the ALC voltage and provides internal protection of the power amplifier stage. ALC voltage is applied to the RT-1444 to control amplifier drive level and to the gain control attenuator. The ALC voltage level can be developed and controlled by any one of the three operational amplifiers (peak effective power (PEP) limiter, dissipation limiter, or current limiter). Under normal operating conditions, the circuit adjustments are set so that the PEP limiter primarily develops and controls the ALC voltage level. The output of the operational amplifiers are through the internal protection amplifier.

(a) PEP limiter. The PEP limiters maintains the output power at a nominal rated power of 150 watts. The PEP limiter monitors tune power, heatsink, overtemperature thermostatic switch, and forward power dc analog inputs. (The forward and reflected power dc analog signals are developed in discriminator assembly A2A1.) During normal operation, forward power dc analog signal input from discriminator A2A1 is used to determine the ALC voltage level. During a tune sequence, the reference level of the PEP limiter is lowered to maintain the output power of the AM-7148 at approximately 30 watts tune power. Two thermostatic switches mounted to the heat sink, monitor the temperature of the driver and output transistors. If the heat sink temperature exceeds 74°C (165°F), the thermal switch (A1S2) closes and the heat sink blower (A1B1) runs to lower the heatsink temperature. If the heat sink temperature exceeds 118°C (244°F), the thermal switch (A1S1) opens and the signal is applied to the PEP limiter. This input lowers the reference level of the PEP limiter to set power transistors to a lower gain. The power amplifier output transistor heat is reduced and lowers the heat sink temperature below 118 C.

(b) Power detector. The power detector input voltages from discriminator assembly A2A1 are proportional to forward and reflected power. A thermistor within the heat sink assembly develops another voltage and the TIP signal from microprocessor circuit card A4A1 provides a fourth. The output of the power detector provides one input to the dissipation limiter.

(c) Dissipation limiter. The dissipation limiter monitors a sample voltage input from the +26.5 Vdc power supply, control voltage proportional to the final amplifier collector current and the input from the power detector. The difference between the ac input power to the final rf amplifier and output rf power of the AM-7148 is the approximate power dissipated in the final rf amplifier transistors. If the dissipation is too high, an appropriate ALC voltage is generated by the dissipation limiter to maintain rf output transistor dissipation at a level not to exceed an allowable level.

(d) Collector current. The final amplifier output transistors collector current is metered by an operational amplifier on the power amplifier assembly which develops a proportional control voltage that is applied to a current limiter. If the input is greater than a predetermined level, an ALC voltage is generated. This ALC voltage is applied to the RT-1444 to decrease its output drive to the

power amplifier, which in turn, maintains power amplifier output transistor collector current at a safe level.

(e) Internal protection amplifier. The output of the internal protection amplifier provides ALC to the RT-1444, controls the loss set by the input attenuator on power amplifier A1A1 and protects the output transistors from transient conditions. When the ALC voltage fails to limit the RT-1444 output drive sufficiently, or quickly enough to adequately protect the final amplifier output transistors, the amount of attenuation provided to the input is increased.

(3) A4A2 Power Supply Circuits. The power supply on control logic card A4A2 consists of a standby +5 Vdc zener-regulated supply, a switched +5 Vdc, a +26.5 switching-regulated supply, and a -0.6 Vdc inverter supply. The standby supply is activated and remains on as long as RT-1444 is on. Any time a control function is activated from RT-1444 (such as a change of frequency, key activation, etc), the switching regulator and other supplies are turned on. These supplies provide the higher current requirement for all circuits except the relay drivers. The relay drivers operate from the +26.5 Vdc supply voltage from the power conditioner. The switched supplies remain on only long enough for completion of the desired operation, and are then switched off to reduce current drain. Switching of the +26.5 Vdc occurs when a pulse is generated by the appropriate RC network to provide the same functions as the arrival of a TUNE START pulse. This pulse is generated when the PTT key is depressed, the ANT SEL switch setting is changed, or the MONITOR/TEST switch is set to MODULE TEST. The logic states set by the this pulse are reset approximately one-half second after being set if +26.5 volts switching has not occurred. If switching of this voltage has not occurred, a logic 0 is applied to the g segment (center bar) of the BITE display (A5A1). A power supply sample voltage output is provided for the power amplifier control circuits and BITE fault diagnosis. Short-circuit protection is included in all power supplies.

(4) Status/Fault Diagnosis. Built-in test equipment (BITE) consists of circuitry that monitors system performance, performs self-test functions, and conducts trouble analysis. BITE functions are activated by the MONITOR/TEST selector switch (A5S2) which is a three position selector switch (SYSTEM STATUS, MODULE TEST, and DISPLAY OFF). In DISPLAY OFF position, the 7-segment BITE display (A5A1DS1) is disabled.

(a) System Diagnosis. When the MONITOR/TEST selector switch is set to SYSTEM STATUS, the BITE circuits are turned on and the AN/URC-113 system operation is monitored. During test (2 second duration), a zero (0) is indicated on the BITE display. After test is complete, the BITE display goes blank to indicate a no fault condition. If during the test, a system fault condition is detected, the BITE display presents a letter, number, or symbol that identifies the system unit (power source, RT-1444/URC, antenna, or AM-7148/GRC-206) that is faulty. (Refer to Chapter 5 for description and and intrepretation of fault indicator displays.)

(b) AM-7148 Diagnosis. When the MONITOR/TEST selector switch is set to MODULE TEST, a BITE software program is initiated which tests the operational status of the AM-7148. The BITE program then automatically and sequentially performs four performance tests on the AM-7148 which evaluate its operational status. This BITE program continues until either a fault is detected or the MONITOR/TEST selector switch position is changed. Time to complete the MODULE TEST function is less than five seconds. The performance tests are performed in the following sequence.

1 Test 1. Checks all relays in antenna tuner assembly A2 and associated drivers on control logic assembly A4. If any faults are detected during this test the appropriate fault code is output.

2 Test 2. Checks each of the seven filter band input and output relays on low pass filter assembly A3 (for open relay) and associated drivers on control logic assembly A4 (for faulty driver). If any faults are detected during this test the appropriate fault code is output.

3 Test 3. Checks three relays not checked in test 1 or test 2. If any faults are detected during this test the appropriate fault code is output.

4 Test 4. Performs a dc test and rf functional test of the AM-7148. This enables the test oscillator relay and removes rf input from power amplifier A1A1 input and applies the 3.6 MHz oscillator output to power amplifier A1A1 input. If any faults are detected during this test the appropriate fault code is output. At the end of test 4, the input port is enabled to permit self-test data (and any fault codes) to be applied to the BITE diagnosis circuit and on to the BITE display.

b. Microprocessor Circuit Card A4A1. Microprocessor circuit card A4A1 is interfaced to the control logic card A4A2. The microprocessor circuitry is an eight bit, bus-oriented system comprising a buffered unidirectional address bus, a buffered bidirectional data bus, a 6802 microprocessor unit (MPU) and the necessary control interface. The control interface provides overall logic control of individual microprocessor functions by individual interconnect lines.

(1) Logic Signal Routing. All inputs to microprocessor circuit card A4A1 are multiplexed onto the data bus through buffers. These buffers receive data directly from control logic circuit card A4A2. Logic signal routing is accomplished using line decoders to provide a memory-mapped addressing scheme. The microprocessor control program reads each input and generates appropriate output data. The output ports consist of addressable latches and two 8-bit parallel ports. These output ports provide control information to the control logic circuits, and are used to generate self-test data for the BITE circuits on control logic assembly A4.

(2) PA Filter Band Control. The frequency BCD data (10 MHz and 1 MHz weights) from the RT-1444 are applied through input detectors on control logic assembly A4A2 to input ports (line receivers) on microprocessor circuit card A4A1. These bits are gated onto the data bus by the microprocessor under program control. The microprocessor converts the parallel data into serial data and passes it, with three address bits, through hex buffers to 8-bit addressable latches on control logic circuit card A4A2 and microprocessor circuit card A4A1. When addressed, the A4A2 latches produce a logic 0 on the proper output line (band 1 - band 7) that corresponds with the selected frequency. This logic 0 is applied to the appropriate band-select relay in low pass filter assembly A3. This causes the correct filter values to be switched into the rf signal path. The same type of 8-bit addressable latches and the same bit structure are used to operate relays in antenna tuner A2.

(3) Antenna Tuner Control. Analog signals from discriminator assembly A2A1 are applied to input detectors (comparators) on control logic assembly A4A2. The comparator output, in each case, is a logic level which depends on whether the input signal is above or below a predetermined dc input level. These bits (logic levels)

are connected to input ports on microprocessor circuit card A4A1. The bits are then gated onto the data bus by the microprocessor, under program control. The software program compares the appropriate input bits with a relay matrix look-up table in memory and then outputs: serial data on the D0 bit line of the data bus; output line selection on address lines A0, A1, A2 of the address bus; and a chip-select logic level to the chip select encoder. This action selects the approriate 3-to-8 line latches on control logic circuit card A4A2. The outputs of the latches turns on selected relays in antenna tuner assembly A2 which switch in the proper LC constants for the frequency and rf output parameters. One latch also operates one of the seven band-select relays of low pass filter assembly A3.

(4) Microprocessor Clock. The microprocessor clock is resident on the microprocessor and uses an external 3.6 MHz crystal oscillator to provide internal and external timing information.

(5) Timer Circuits. In addition to the basic microprocessor system, microprocessor circuit card A4A1 contains a relay drive timer, a tune timer, and a 3.6 MHz self-test oscillator. The relay drive timer limits the length of time coil voltage is applied to all latching relays. The tune timer disables the power amplifier output and declares a fault if antenna tuning is not complete within five seconds. The 3.6 MHz self-test oscillator uses the same crystal as the microprocessor clock to provide a sinusoidal 3.6 MHz signal for injection into the power amplifier during BITE diagnostic testing.

(6) Nonmaskable Interrupt. A nonmaskable interrupt (NMI) is sent to the microprocessor if the rf current or voltage rises above the predetermined limit. The two parameters are wired OR'ed to one input of a comparator. If the comparator output rises as a result of an overlimit condition, the microprocessor receives a NMI signal. Upon receipt of the NMI, the microprocessor completes any execution cycle that may be in process and then immediately acknowledges the critical interrupt flag by addressing the circuit protection logic.

4-21. UPPER ELECTRICAL CHASSIS A5. Upper electrical chassis A5 contains the input power conditioner A5A4, audio amplifier A5A3, LC filter A5A2 and BITE display circuit card A5A1DS1. Refer to figure FO-14 and the following paragraphs.

a. Input Power Circuits. The input power conditioner circuits are mounted on upper electrical chassis A5 and consists of descrete components and power conditioner A5A4. This circuitry conditions the input power and protects the AM-7148 from transients. Power for the AM-7148 is applied through J6 on the rear panel and passes through a chassis mounted L-C filter A5A2. The input voltage is applied across two fast acting zener diodes. These zener diodes provide polarity protection and limit transients in excess of 45 volts to permit two discrete MOSFETs to regulate within their limits.

(1) MOSFET Regulator Circuits. The two MOSFETs operate as master and slave pass elements. One is adjusted to pass a current level that is approximately 500 mA less than the current in the other. This current sharing is monitored and controlled by power conditioner A5A4. The MOSFETs form a floating series regulator. This regulator will hold the output voltage to a maximum of +27 Vdc if input voltage is +28 to +30 Vdc, but if the input voltage drops below +28 Vdc, the output will also drop.

(2) Power Conditioner A5A4. Power conditioner A5A4 monitors the input and output voltage and controls the bias to the MOSFETs. This allows the AM-7148 to operate over a wider voltage range and low voltage conditions. A low voltage monitor will shut down the AM-7148 if the input power exceeds +31 Vdc for an extended period of time. A 555 timer chip operates as an oscillator along with a transformer at around 25 kHz. The output of the oscillator is rectified and provides a constant +15 Vdc even if the input voltage to the system varies. This +15 Vdc is used to develop a reference voltage of +6.2 Vdc for the rest of the power conditioner circuits.

b. Audio Amplifier Circuits. Refer to figure FO-14. The audio amplifier circuits are physically mounted on upper electrical equipment chassis A5. The audio amplifier (A5A3) drives the loudspeaker which permits the AM-7148 to be monitored without listening to a handset or headset. There is a VOLUME/OFF control on the front panel of the AM-7148 that permits independent control and level adjust of audio input to the speaker (A5LS1) only.

(1) First Input Amplifier. The first input amplifier has the audio signal applied through the VOLUME/OFF control and a switching transistor. The VOLUME/OFF control will either disable (OFF position) the audio input to audio amplifier A5A3, and/or adjust the level of audio input to A5A3. The switching transistor is controlled by the key line and acts to mute the amplifier in the transmit mode. The first input amplifier provides a large voltage gain and couples the audio signal to the second input amplifier through a resistive/ capacitive (RC) network.

(2) Second Input Amplifier. The second input amplifier provides additional voltage gain and drives the output transistors. A sample of the audio output signal is fed back to the second input amplifier and is used for gain control.

(3) Output Transistors. The output transistors operate in a quasi-complementary configuration to provide the current gain required to drive the loudspeaker. RC network feedback around the output stage establishes the gain/response required for stability.

4-22. RSC FUNCTIONAL OPERATION. The RSC is the input/output (I/O) terminal for the SDU. It is electrically slaved to the SDU for control and physically slaved to the operator(s). As such, it provides man-machine interface for transmit and receive functions, and includes both audible and visual system status indicators.

a. Audio Interface. Each operator can select one of four radio subsystems or the intercom for audio modulation or for reception. All transmit actions require specific operator inputs such as transmit selection and transmit keying. All or portions of received audio may be monitored or subject to selective individual operator control. All signal modes are subject to restrictions set by the SDU which monitor red-black communication status, transmit selection, BITE faults, and command and control signals.

b. Visual Interface. The control panel uses positive inputs from the keyboard and the SDU. The frequency readouts (liquid crystal displays) are mounted on the top of the panel to provide a centralized viewing area for the operator(s). The displays include visual enunciators that indicate status/mode of each subsystem. During power up, a display test is automatically performed. Following the test, all indicators return to the last operating conditions. Memory for the last operating conditions of the HF-SSB and the VHF-FM subsystems are retained by the SDU.

Memory for the last operating conditions of the VHF/UHF-AM subsystems are retained by the individual receiver-transmitter (RT-1319). Following power up, the display lighting will time out for power conservation and blackout operation.

c. Physical Interface. The physical interface permits the operator(s) control of the audio interface and all subsystems that are contained within the Radio System. Audio volume is controlled by separate operator master volume controls and five subsystem volume controls. Audio selection is through keyboard entries and switch positions controllable by the individual operator. The RADIO TRANSMIT switch allows operator selection of only one subsystem for transmission. If the RADIO TRANSMIT switch is placed in the OFF position, the operator is in the receive only mode. When in any position other than OFF, the operator, through keyboard entries has control over the modulation of the selected subsystems during transmission.

d. Audible Alarm Interface. In addition to the visual alarms, audible alarms are provided to resolve man-machine conflicts and aid in monitoring system status under all lighting conditions and during blackout operations. Separate tones are provided for open fiber optic cable, BITE/fault alert, secure radio in use, radio in use, and operator error. The tones are generated by counters resident on the digital interface CCA. The SDU monitors the Radio System operating conditions and provides the command to enable all (except open cable) tones generated at the RSC. The RSC can only detect an open fiber optic cable condition and command generation of the open fiber optic cable tone. This allows the receive channel of the full duplex fiber optic cable to be monitored for broken or open cable conditions. The following subparagraphs describe the audible tones generated by the RSC.

(1) Open Fiber Optic Cable Tone. This tone is initiated by an open or broken fiber optic cable. It is a continuous 390 Hz single frequency tone. This tone remains on until the condition is cleared and the RSC power is reset.

(2) Operator Error Tone. This tone is initiated by erroneous keyboard entries at the RSC. It is a 1000 Hz single frequency tone (0.8 seconds on and 0.8 seconds off) and is present in the handset/headset for 1.28 seconds. The tone is similar to a morse code error signal (eight dits).

(3) Secure Radio In Use Busy Tone. This tone is initiated by attempted transmitter keying which could result in a communication security compromise. It is a two frequency tone of 350 and 617 Hz (0.8 seconds on and 0.2 seconds off). The tone is present in the handset/headset for eight seconds or until PTT key is released.

(4) Radio In Use Busy Tone. This tone is initiated by operator keying of active (in use) transmitter. It is a two frequency tone of 481 and 617 Hz (0.5 seconds on and 0.5 seconds off). The tone is present in the handset/headset for eight seconds or until PTT key is released.

(5) BITE/Fault Alert Tone. This tone is initiated by detection of a subsystem fault (BITE) by the SDU. It is a two frequency tone of 400 and 617 Hz (0.2 seconds on and 0.5 seconds off). The tone is present in the handset/headset for 5.6 seconds or until PTT key is released.

4-23. RSC CIRCUITS. Refer to figure FO-15. The RSC consists of a case assembly, regulator, backlighting driver, regulator plate assembly, fiber optic module, panel assembly, digital interface CCA, audio interface CCA, and a keyboard. The regulator A1A1, backlighting driver A1A2, regulator plate assembly A1A3, and fiber optic module A1A4 are all subassemblies of the case assembly A1. The digital interface CCA A2A1, audio interface CCA A2A2, and keyboard A2A3 are all subassemblies of the panel assembly A2.

a. Transmit Audio Circuit Functions. Transmit audio from the front panel audio connectors (J1 through J4) is routed to audio interface CCA A2A2 and applied to a three stage buffer amplifier section. This section amplifies the input audio to approximately 0 dBm and interfaces it to the input of one of two CVSD converters (refer to figure 4-10). The output of the CVSD converter is a digital signal at the sampling rate (normal voice inputs are sampled at 25 kbps). The output of the CVSD converter is fed to a digitally controlled analog switch that is controlled by command and control (C&C) data from digital interface CCA A2A1. The digitized audio is routed from the selected output of the analog switch and input to the transmit section of a communication UART on CCA A2A2. The communication UART formats the digitized audio for output in the appropriate bit position of the RSC-SDU communication words (refer to figure 4-11). The communication words consists of a start bit, six data bits, and a stop bit, and is output at a serial data rate of 200 kbps. The communication words are input to the transmitter section of fiber optic module A1A4 which converts the digital signal to optic transmissions. The fiber optic light-emitting diode (LED) output is interconnected to the SDU via fiber optic link. Internal to the SDU, the fiber optic receiver associated with the active RSC converts the signal from optic-to-digital and inputs it to a CVSD for digital-to-analog conversion. When no system status conflicts are detected by the microprocessor resident in the SDU, transmit audio inputs are routed to the appropriate radio subsystem or intercom. When a system status conflict is detected by the SDU, the SDU outputs command and control data signals via its transmit fiber optic path (RSC receive path) to enable the appropriate visual indicator and/or audible alarm at the active RSC.

b. Transmit Command and Control Functions. Refer to figure 4-12. Transmit command and control inputs are generated by keyboard entries, positioning of the RADIO TRANSMIT select switch, PTT switches and DATA port status. These inputs are routed to the appropriate decoder and/or latch circuit which outputs eight data bits representing transmit command and control data, and transmit keyboard keycode data.

(1) Transmit Command and Control Data. The transmit command and control data includes transmit selection information derived from the operators (1 and 2) RADIO TRANSMIT and PTT switches. The selected position of the RADIO TRANSMIT switch and the condition of the associated PTT key are input to switch decoders and data latches on CCA A2A1. The data latches (tri-state buffers) respond to output enable signals from the EPROM state circuitry of CCA A2A1 which controls data available to the transmit section of the command and control UART. When enabled, eight data bits are output from the latch circuits and input to the transmit section of the command and control UART. The command and control UART formats the eight data bits into an eight bit serial data word (see figure 4-13). The serial data output (SDO) of the command and control UART is interconnected to the transmit bus of the communication UART on CCA A2A2. This information is made available to the SDU when any key is pressed.

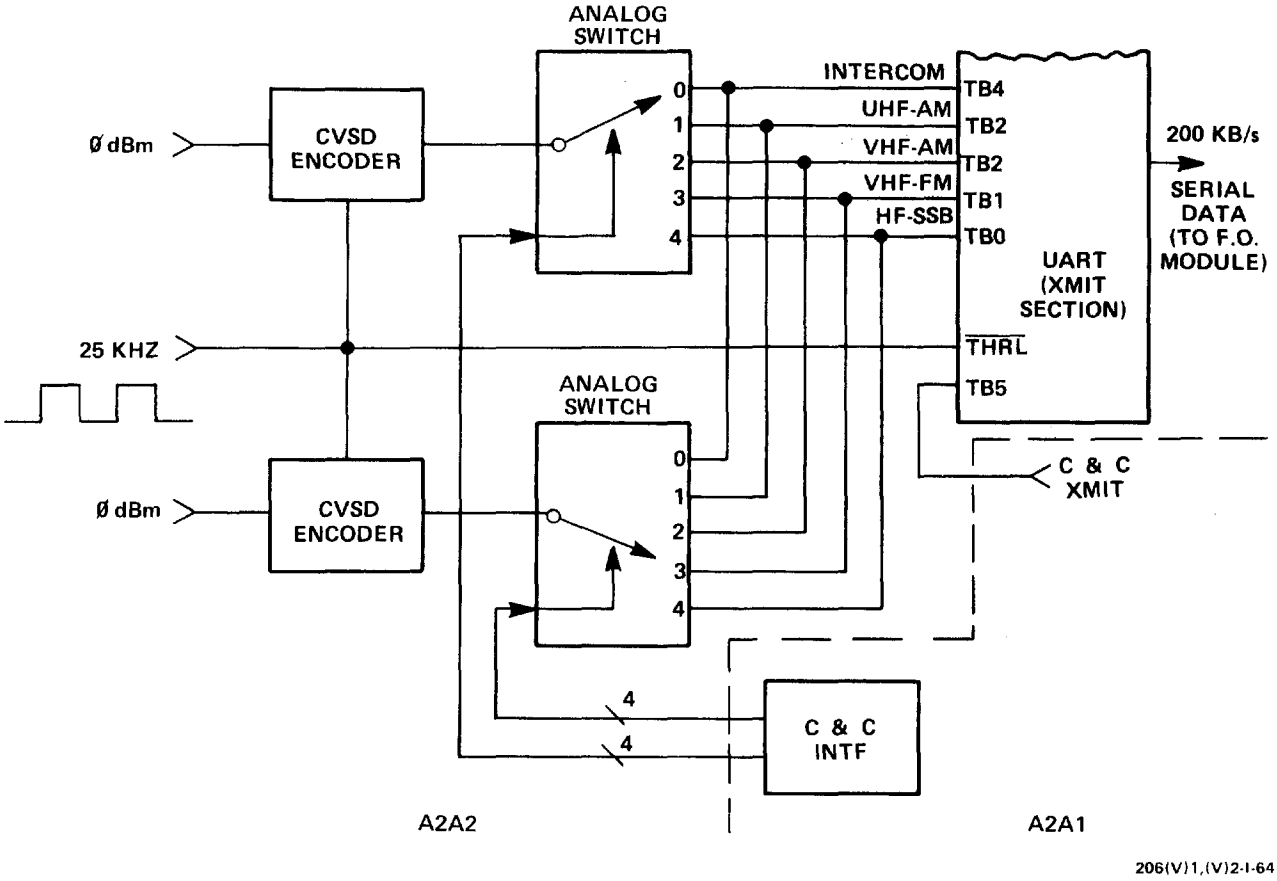


Figure 4-10. RSC Transmit Audio Simplified Block Diagram

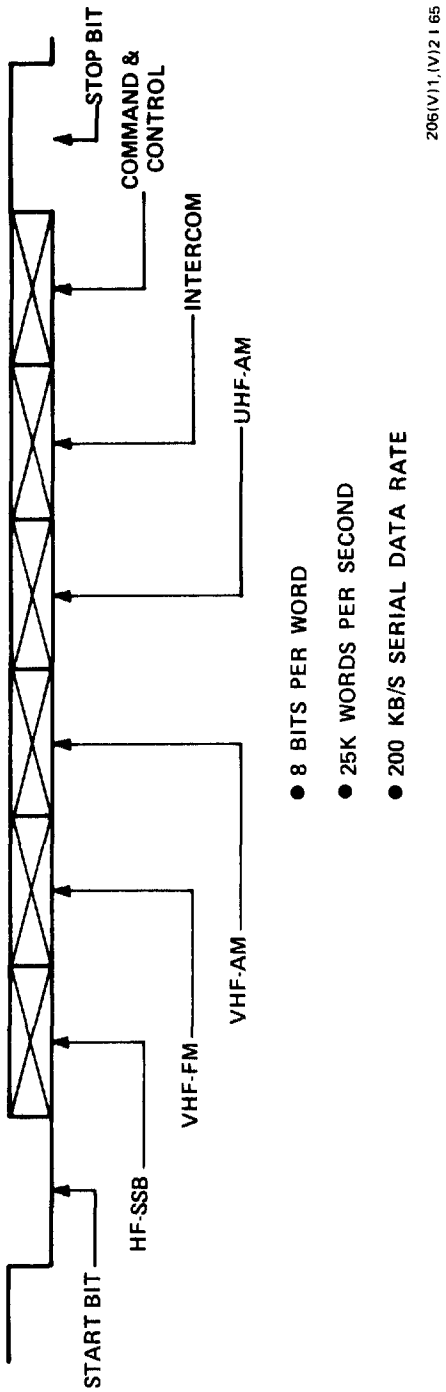


Figure 4-11. RSC-SDU Communication Word Format

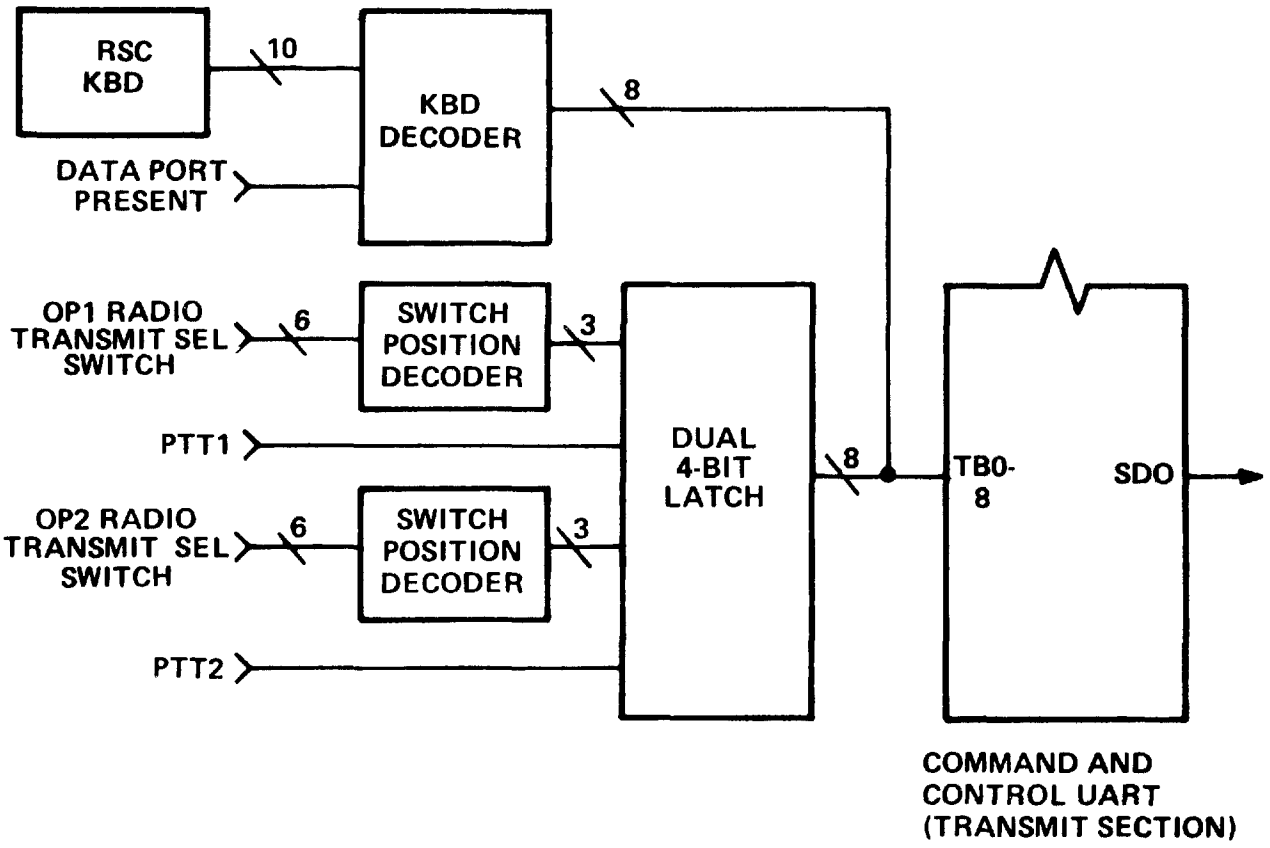


Figure 4-12. RSC Transmit Command and Control Simplified Block Diagram

(2) Transmit Keyboard Keycode Data. The transmit keyboard keycode data includes transmit selection information derived from keyboard entries and the status of the DATA port at operator 1 position (pin E, J1/J2). The keyboard entries and the status of the DATA port are input to a keyboard decoder on CCA A2A1. The keyboard decoder responds to output enable signals from the EPROM state circuitry of CCA A2A1 which controls data available to the transmit section of the command and control UART. When enabled, eight data bits are output from the keyboard decoder and input to the transmit section of the command and control UART. The eight data bits include five data bits which identifies the keyboard key struck by the operator, and three data bits to reflect status of the DATA port. Keyboard and DATA port status inputs are then formatted by the command and control UART (see figure 4-13) and input to the communications UART on CCA A2A2 for processing as transmit command and control data which is optically transmitted to the SDU for processing.

c. RSC Receive Audio Circuit Functions. Refer to figure 4-14. The receive signal from the radio subsystem is processed by the SDU from analog-to-digital and from digital-to-optic signals and sent to the RSC. The RSC fiber optic receiver photo diode changes the signal to serial data. The signal is then amplified and input to the receive section of the communication UART on CCA A2A2. The UART processes the input serial data and outputs it to five CVSD converters. Additionally, receive command and control data is output to the receive section of the command and control UART on CCA A2A1 which provides receive clocking controls and receive select strobes to CCA A2A2. The analog outputs are routed from CCA A2A2 to the five front panel volume control adjustments (R3 through R7, see figure FO-15). The individually adjusted signals are returned to three switch banks on CCA A2A2 (see figure 4-15). The switch bank outputs are controlled by receive audio clocks and receive audio strobes generated by the command and control UART on CCA A2A2. One of the three switch banks controls audio to be delivered to the RSC speaker. The output of the speaker switch bank is routed to a summing network through the SPKR OFF-VOLUME control, R9. When enabled, audio is adjusted and returned to CCA A2A2 circuitry where push-pull amplifiers provide amplification of the signal for application to the loudspeaker. Audio for the operator(s) is routed through the two other switch banks to controlled 6 dB attenuators. Also input to these attenuators is the status alert tones. During transmit conflicts, the appropriate tone is routed to the conflicting operator. The position of the RADIO TRANSMIT switch determines the state of the attenuators, e.g., the selected position is not attenuated and the signal input to the operator headset/handset is 6 dB higher than the volume of other signals being processed by the RSC. The output of the attenuator is summed and coupled to CCA A2A2 J2-8 and J1-9 and connected to the MSTR VOLUME controls (R8 and R2) for the individual operator positions. This individual controlled audio is routed to CCA A2A1 and is amplified and returned to CCA A2A2. This audio is then transformer coupled to the operator(s) HANDSET-DATA connectors J1/J2 and HANDSET connectors J3/J4.

d. Receive Command and Control Circuit Functions. Receive command and control data from the SDU consists of eight bits, framed by a low start pulse and a high stop pulse (see figure 4-16). This data word contains address information (four bits) and data bits (four bits). These data words control the selection of the audio paths, selection of tones during conflicts, and display update data (frequency, call, plain or clear text, squelch, SSB selection). This information is input to the receive section of the command and control UART on CCA A2A1. The UART three state drivers outputs into circuitry that controls display clocking, audible tone shift control, tone registers, transmit and receive audio clock selection, receive audio strobing and the serial data for the multiplexer/demultiplexer.

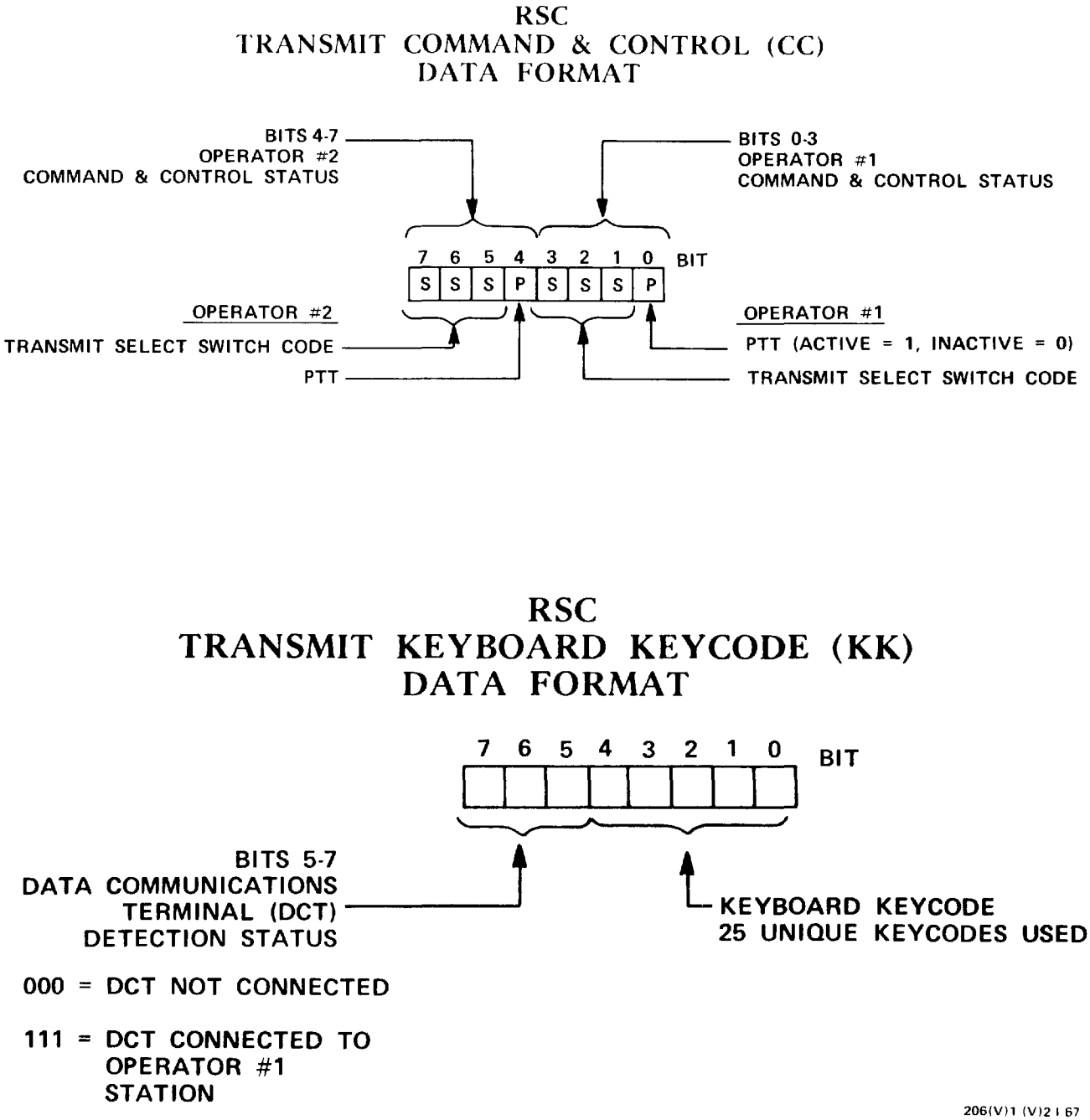


Figure 4-13. RSC Transmit Data Word Formats

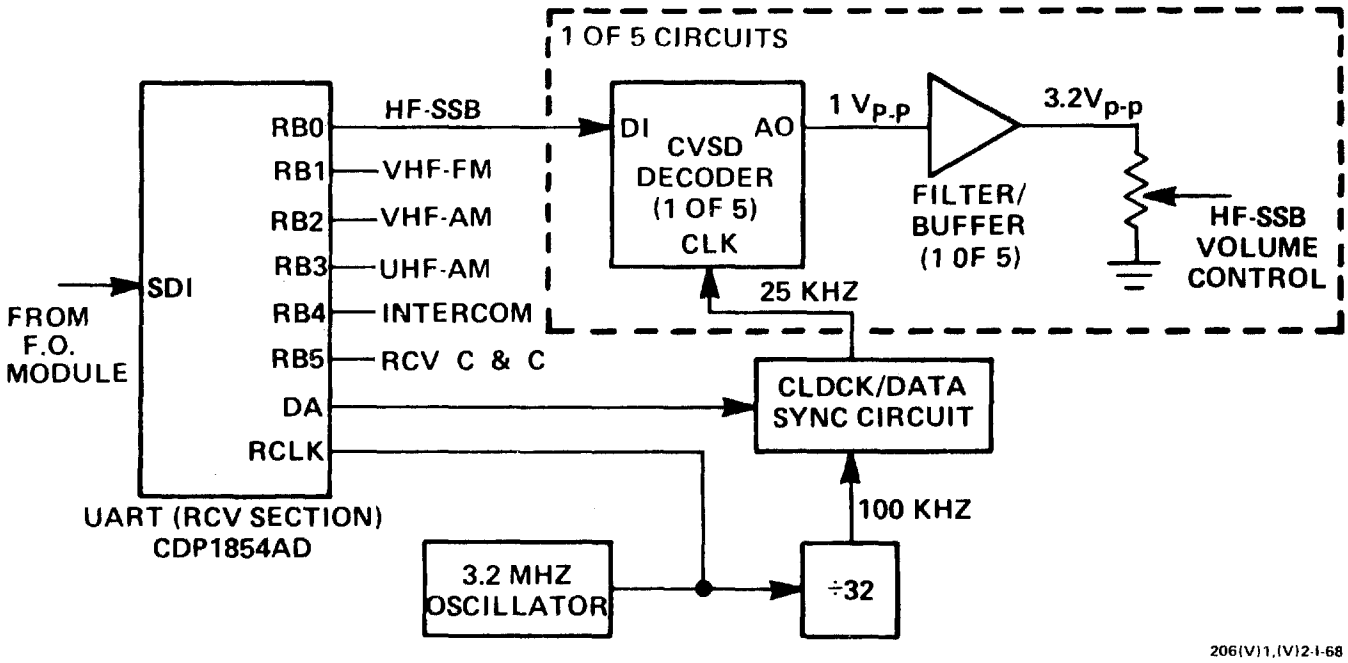


Figure 4-14. RSC Receive Audio Simplified Block Diagram

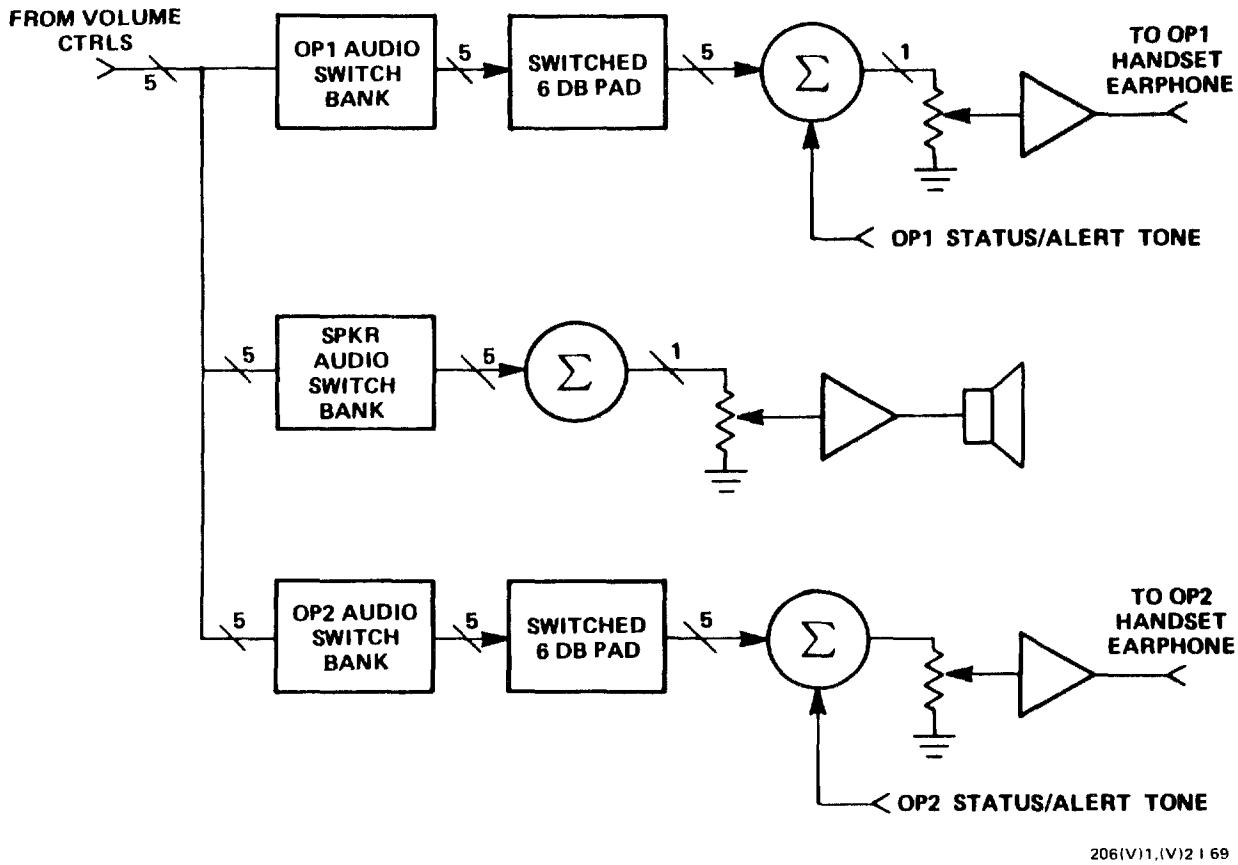


Figure 4-15. RSC Receive Audio Routing Simplified Block Diagram

e. Power Distribution Circuits. Operating voltages are derived from battery source during remote operation (RSC located more than 20 feet from SDU) and from the SDU interconnecting power cable during local operation. Battery inputs are at J1 and J2 of the case assembly. External power from the SDU is connected to case assembly connector J6. The +28 Vdc is routed through CCA A2A2 to CCA A2A1 (J3-6) and is connected on A2A1 (J5, J6, J7, J8) for LCD heater power. The LCD temperature sensors are positive coefficient resistors: e.g., decrease in temperature causes the heater current to increase. At normal ambient temperatures current flow stops and no heat is applied to the LCD. During battery operation, the +12 Vdc entering J4-14 is routed to the fiber optic transmitter assembly A1A4. The +17 Vdc is routed to A1A1, a shunt power supply that provides +17 Vdc to the speaker and CCA A2A2. Circuits within CCA A2A2 produces the +9 and +14 Vdc for component operation. Additionally, power is routed to the backlighting driver (A1A2) for panel lighting. The panel lighting driver contains a dc/ac inverter card which changes the dc input to 100 volt ac output. The output is varied and switched by the A1R1 dimming control. The power is then routed through CCA A2A1 for display and keyboard lighting. The +14 Vdc output is monitored on CCA A2A1. During operation, should battery power decrease below the limits of the required regulated output, exclusive OR gate circuits contained on CCA A2A1 produce a low battery indication on the front panel status enunciator.

4-24. VHF BITE PANEL CIRCUITS. The VHF BITE panel provides the audio interface between the VHF-FM radio, the SDU, and KY-57 encryption device (when installed in AN/GRC-206(V)1). It also provides BITE capabilities for the VHF-FM subsystem. The VHF BITE panel includes five external connectors (J1 through J5) and a FM BITE/audio interface CCA which mounts the circuitry necessary to provide the audio switching and BITE capabilities. Circuits contained on FM BITE/audio interface CCA A1 are described in the following subparagraphs (see figure 4-17).

a. FM BITE Circuits. The FM BITE circuits include a shielded transformer (T1), a bandpass filter, a comparator and a voltage reference circuit. Transmitter power in route to the VHF-FM antenna is interfaced through VHF BITE panel connector J2. Internal to the VHF BITE panel, transmitter power is transformer coupled to the filter and voltage reference circuits. The output of the filter and voltage reference circuits is applied to a comparator's non inverting and inverting inputs, respectively. Voltage at the comparators inverting input is established by the voltage reference circuit predetermined output which is approximately equal to one-half (3 dB) of the normal output power of the transmitter. When voltage at the comparators noninverting input falls below the reference voltage at the inverting input, the normally low output at connector J3 pin C goes high indicating BITE fault. This BITE fault signal is routed to the SDU which generates and outputs the appropriate command and control data to the active RSC. The active RSC then alerts the operator with an audible alarm and visual FAULT indication.

b. Audio Interface Circuits. The audio interface circuits include a triple 2-channel multiplexer (only two multiplexers used) and a NOR gate circuit. The two multiplexer circuits are digitally controlled and provide audio switching between the wideband and narrowband amplifier circuits in the VHF-FM radio. This circuit functions as a jumper and routes audio to the wideband amplifier whenever the KY-57 encryption device is installed in the audio path between the VHF-FM radio and the SDU. When the KY-57 is installed in Radio Communication System AN/GRC-206(V)1, ground is present at J5-K causing the multiplexer circuit to actuate for wideband

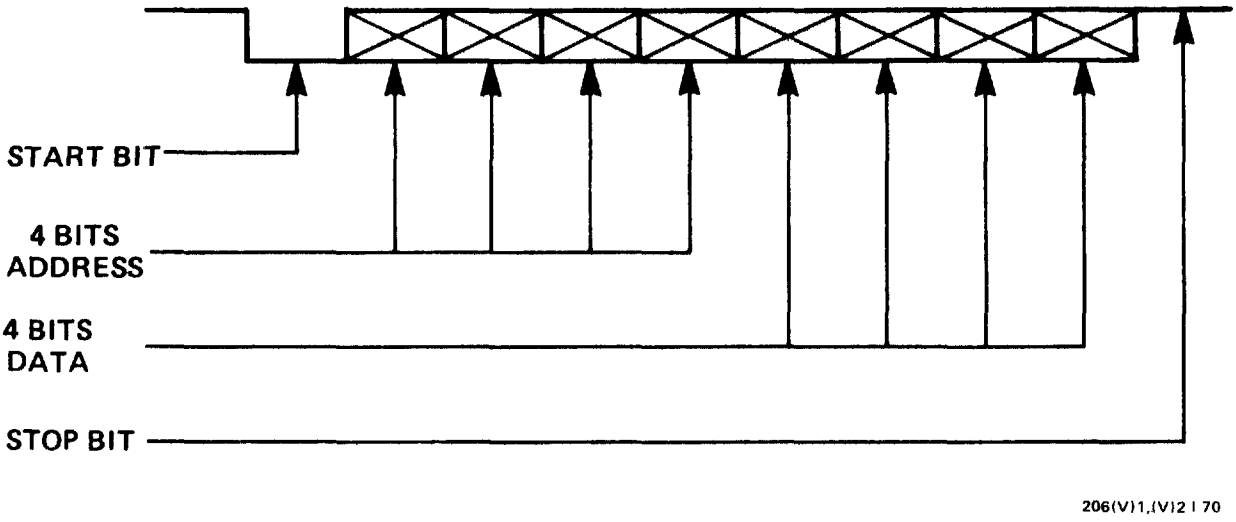


Figure 4-16. RSC Receive Command and Control Word Format

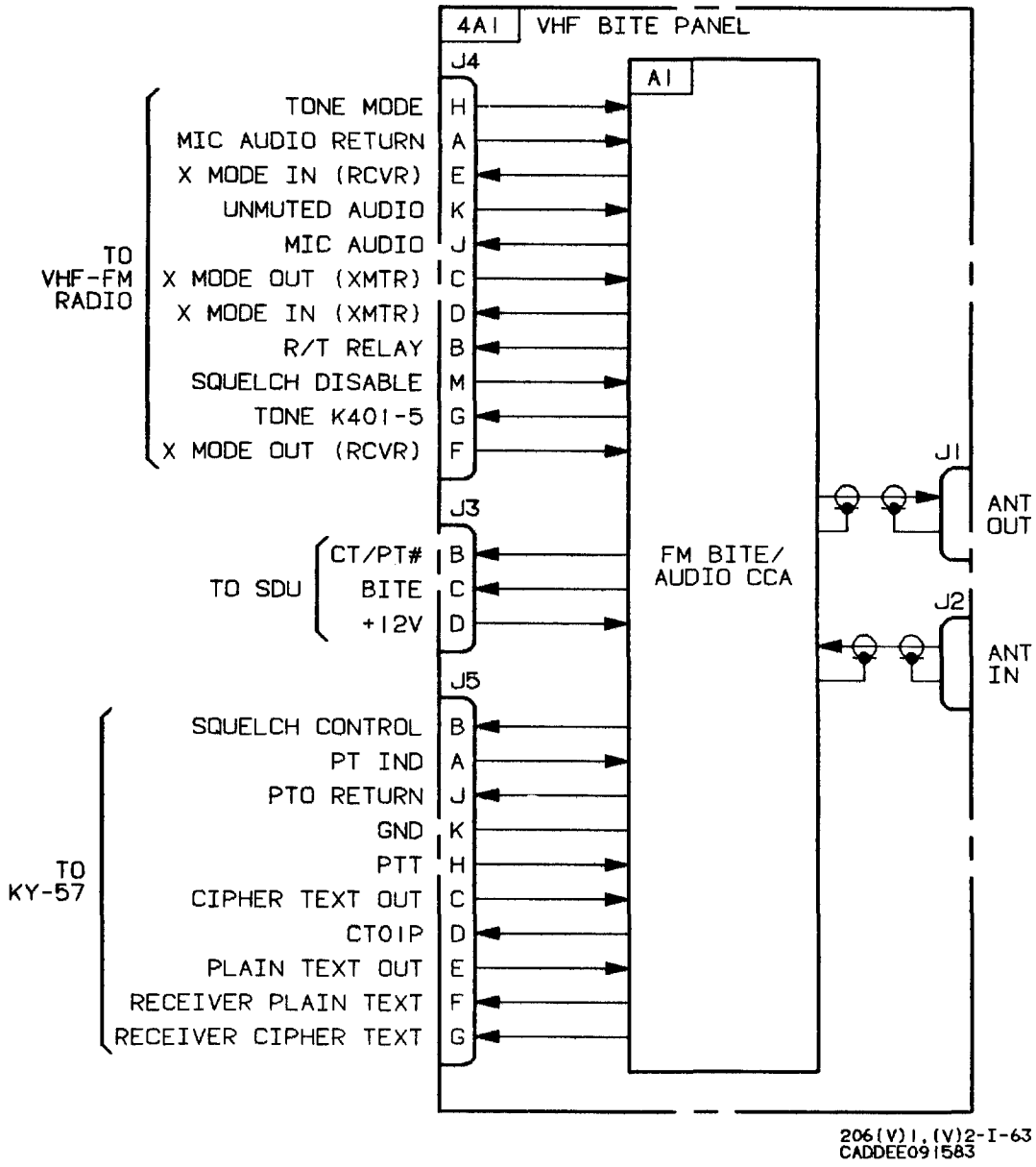


Figure 4-17. VHF BITE Panel Block Diagram

operation. When the KY-57 is not installed, or in Radio Communication System AN/GRC-206(V)2 applications, the link at J5-K is open causing the multiplexer circuit to actuate for normal narrowband operations. A NOR gate circuit is used to produce the CT/PT# signal output at J3-B. The plain text indicate (PT IND) signal at J5-A is NORed with the multiplexer (narrowband) select input. The output (CT/PT#) of the NOR gate circuit is used to indicate to the SDU whether the VHF-FM subsystem is communicating in clear or plain text mode of operation.

4-25. VHF/UHF-AM CIRCUITS. Circuit descriptions for the VHF/UHF-AM radio sets are identical to circuit descriptions for Radio Set AN/VRC-83(V)1. Refer to TO 31R2-2VRC83-2 for VHF/UHF-AM radio set circuit descriptions.

4-26. VHF-FM CIRCUITS. Circuit descriptions for the VHF-FM radios is identical to circuit descriptions for Radio Set AN/VRC-45 and AN/VRC-46. Refer to TO 31R2-2VRC-221.

Section IV. FUNCTIONAL OPERATION OF MECHANICAL ASSEMBLIES

4-27. GENERAL. This section describes the operating principles of the mechanical assemblies of the Radio System. The reeling machine used to recover remotely deployed fiber optic cables is covered in this section. Other mechanical assemblies, found within units of the Radio System, that are applicable to the intermediate maintenance level are described in the individual equipment manuals. Refer to the appropriate unit manual listed in table 1-8 for coverage of mechanical assemblies within a particular unit of the Radio System.

4-28. REELING MACHINE. The reeling machine (figure 4-18) is the mechanical assembly used to aid in deployment and recovery of fiber optic cables used during remote operations. The reeling machine includes all items shown in figure 4-18 except the reel and cable assemblies. The leg, brace and handle may be folded and secured for easy stowage. The crank assembly may be mounted on either end of the axle, allowing either right-hand or left-hand operation. The cap secures the axle to the mount and contains a friction pad which allows drag on the axle to be adjusted. An optional reel axle is available for 2 man deployment (PN 944137-801).

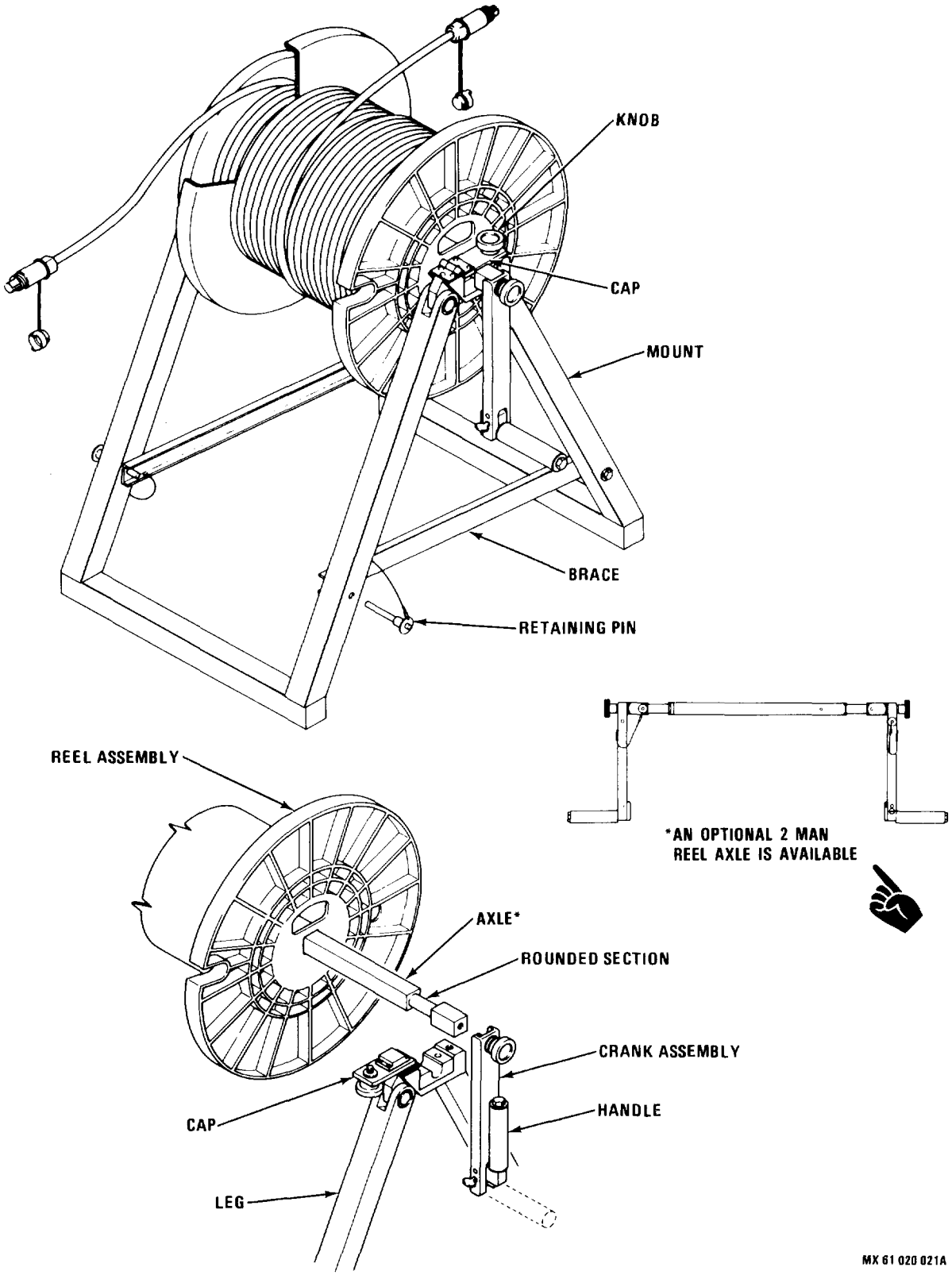


Figure 4-18. Reeling Machine Assembly Diagram

CHAPTER 5

MAINTENANCE

5-1. INTRODUCTION. This chapter contains detailed instructions for removal, replacement, repair, adjustment, and testing of all equipment which is unique to the Radio System. Detailed maintenance procedures for equipment that is of (but not unique to) the Radio System are listed in the individual equipment manuals. For a complete list of manuals covering the Radio System equipment, refer to table 1-8. This chapter is divided into three sections: Section I, Organizational and Intermediate Maintenance; Section II, Special Maintenance; and Section III, Performance Test Checks.

Section I. ORGANIZATIONAL AND INTERMEDIATE MAINTENANCE

5-2. GENERAL. This section contains information required for maintenance of the Radio System. Maintenance procedures for intermediate level personnel, test equipment required, and any special tools or fixtures are described, illustrated, and their use explained.

5-3. ORGANIZATIONAL MAINTENANCE. Organizational level maintenance is restricted to visual external inspection, external cleaning, functional checks, replacement of LRUs, interconnecting cables and ancillary items. Organizational level maintenance personnel may also refer to TO 31R2-2GRC206-1, for consolidated operator/organizational level maintenance procedures which may decrease maintenance time.

5-4. INTERMEDIATE MAINTENANCE. Intermediate level maintenance consists of isolating and repairing failures, replacing plug-in modules in the LRUs, and performing checkout procedures using general purpose test equipment. Test equipment interface will be limited to equipment test points and plug-in module extender cable/boards as required.

5-5. MAINTENANCE SUPPORT EQUIPMENT. Table 5-1 lists and describes the technical characteristics of each piece of test equipment required to perform the maintenance procedures contained in this section. Table 5-1 does not include support equipment listed in maintenance manuals for the AN/PRC-77, AN/PRC-104, RT-246A/VRC or RT-524A/VRC. Refer to the related technical manuals listed in table 1-8 for use of additional support equipment.

5-6. RADIO SYSTEM MAINTENANCE. Maintenance of the Radio System is accomplished in accordance with the following paragraphs.

a. Operational Checkout. Checkout of the Radio System is accomplished in accordance with the performance test checks contained in section III. These performance test checks will form the bases for all maintenance required at the Radio System level.

b. Troubleshooting. Troubleshooting the Radio System is accomplished in accordance with the interchange procedures in figure 5-1 and the Radio System trouble analysis diagrams provided in figure 5-2. Fault isolation at the system level will consist of isolating malfunctions to a LRU, which is then removed from the Radio

System for further maintenance action. Malfunctions which cannot be isolated to a specific LRU (e.g., RSC/SDU data transfer faults), will require that suspect units be individually interfaced and tested with Radio AN/GRM-116 Test Set (GRM-116 test set). To remove a suspect unit from the equipment mounting rack, refer to the maintenance instructions for that unit.

(1) Interchange Procedures. Interchange procedures are provided in figure 5-1 to aid in isolating malfunctions associated with the RSC/SDU interface. Figure 5-1 illustrates both the fiber optic and power cable interchange procedure and provides a separate analysis diagram. These interchange procedures can aid in identifying F/O cable, power cable, RSC and SDU problems.

(a) Fiber optic cable interchange. This procedure should be performed after an "OPEN CABLE" alarm, or when the Radio System will respond to one RSC but not the other. This interchange procedure may also be used when there are no evident power troubles (lack of power lamps; no tripped circuit breakers) and the Radio System does not respond to commands from the RSC. When this occurs, perform the fiber optic interchange procedures in figure 5-1, sheet 2. For the purpose of trouble-shooting with the fiber optic interchange procedure, the failed path is the "A" path.

(b) Power cable interchange. This procedure should be performed after a "LOW BATTERY" indication is observed at the RSC during local operation (power supplied to the RSC via cable W3 from the SDU). When this occurs, perform the power cable interchange procedures in figure 5-1, sheet 4. For the purpose of trouble-shooting with the power cable interchange procedure, the failed path is the "A" path. The failed path in this procedure is defined as a "LOW BATTERY" indication at the RSC.

(2) Trouble analysis diagrams. Radio System trouble analysis diagrams are provided in figure 5-2. These trouble analysis diagrams are based on symptoms which could occur during operation at organizational level or discovered by maintenance personnel during performance testing. A lists of these symptoms are provided in table 5-2, use the applicable trouble analysis diagram to determined the required corrective action. The trouble analysis diagrams do not cover all possible discrepancies or symptoms, but are provided as a guide for systematic troubleshooting.

5-7. SIGNAL DISTRIBUTION UNIT MAINTENANCE. Maintenance of the signal distribution unit (SDU) is accomplished in accordance with the following paragraphs. The support equipment required to perform the SDU maintenance procedures is listed in table 5-1. Refer to figure FO-9 and FO-10 for schematic diagrams.

a. Removal. Remove the SDU from the equipment mounting rack in accordance with the following procedures. See figure 2-3 for component location.

(1) Turn off power to Radio System.

(2) Disconnect all cables connected to SDU front panel.

(3) Loosen two thumbscrews on SDU-power switchboard mount sufficiently to allow removal of SDU.

(4) Pull SDU from mount.

b. Operational Checkout. Operational checkout test for the SDU is performed in accordance with the performance test checks in section III. The operational checkout is performed with the SDU under test interfaced with Radio AN/GRM-116 Test Set (GRM-116 test set) to determine serviceability. If the required indications are not obtained, perform SDU troubleshooting.

(1) Preliminary Test Setup. Place the SDU on a clean work surface close to GRM-116 test set and perform the following steps:

(a) Place PWR switches on GRM-116 test set equipment and SDU under test to OFF position.

(b) Connect equipment as shown in figure 5-3.

(c) Perform SDU checkout in accordance with the performance test checks in section III.

Table 5-1. Maintenance Support Equipment

Equipment identification	Characteristics
Radio AN/GRM-116 Test Set	Supplies all required voltage levels, control and audio signals, faults, indications, etc., which are characteristic of a known good Radio System.
Adapter Cable Test Set	Consists of all cables required to extend and interface the characteristics of Radio AN/GRM-116 test set with the unit under test (UUT).
Oscilloscope, AN/USM-398	Dual trace, 10 MHz bandwidth, delayed time base.
Digital Multimeter Fluke 8300A	0.1 Vdc to 50 Vdc Input impedance 500K ohms Accuracy ±0.010 volts (0 to 10V), ±0.04V (10 to 50V)
RF Signal Generator HP8640B	Frequency: 10 to 470 MHz AM up to 95% and 400 and 1000 Hz internal Frequency accuracy: ±0.72 kHz Output impedance: 50 ohms Overall signal accuracy (including modulation): ±2 dB Harmonics: >30 dB below fundamental Broadband noise: >130 dB/Hz below carrier up to 400 MHz Time and level set adjustment time less than 5 seconds average
Power Supply HP-6268B	Continuously variable voltage from +18 Vdc to +33 Vdc Current output: 0 to 20 ampere average Current peak (modulation peaks): 30A Regulation: ±0.5 Volts Voltage limiting adjustable from +27.5 to +33 volts Output impedance: Less than or equal to one ohm Ripple voltage: Less than or equal to 0.2 volts peak-to-peak
RF Power Meter, HP-436A	Accuracy: ±5% Power range: 1 to 30 watts Frequency capability: 116 MHz to 400 MHz Input impedance: 50 ohms
Radio AN/GRM-115 Test Set	Test points to monitor test results and provide input test signals. Switches to indicate receive/transmit, remote select, external clock, plain or cipher selection and +24 Vdc power application. Indicator for +24 Vdc Logic to initiate tests

Table 5-1. Maintenance Support Equipment-Continued

Equipment identification	Characteristics
Power Sensor HP-8482B	Required for HP-436A RF Power Meter
RF Voltmeter ME-426/U	Frequency range 10 MHz to 470 MHz Voltage input 1 mV to 3V Input impedance 100,000 ohms, less than 2.1 pf shunt
30 dB Attenuator, Narda 766-30	30 dB ±0.75 dB 30 watt power rating 3 GHz maximum operating frequency 1.1 to 1 VSWR up to 1 GHz 50 ohms impedance
6 dB Attenuator, FP-50-6dB	6 dB ±0.5 dB 50 ohms impedance VSWR 1.2 maximum
20 dB Attenuator, Narda 765-20	20 dB ±0.5 dB 50 ohms impedance VSWR 1.2 maximum
Electronic Counter HP5245L, 5253B	Frequency range: DC to 400 MHz Gate time: 1 msec to 10 sec. Count accuracy: ±1 count from time base
Balanced Mixer CV-2343/U	Frequency range: 116 to 400 MHz Conversion loss: less than 6 dB Balance: greater than 30 dB
Distortion Analyzer HP-339A	Frequency response: 100 Hz to 25 kHz ±1 dB Residual noise: less than or equal to –80 dB Meter range: –80 to 0 dB full scale RMS indication for input signals other than sine wave.
3.1 kHz Audio Filter (flat) KRON-HITE 3700	Required for receive and audio response test.
Test Set, Receiver-Transmitter AN/GVM-9	Provides <5 dB attenuation to test fiber optic module performance under maximum signal conditions and 26 ±2 dB attenuation to test performance under minimum expected signal level. Extender assembly with test points to monitor supply voltages. Cables to interface signals and supply voltages between fiber optic modules and audio interface (1) of the SDU.
Antenna Simulator 172H-21A	Simulates 4.6 m (15 ft) whip antenna over 2 to 29.9999 MHz; 150 watt power handling capability.
Deviation Test Set, ME-57/U	Determines the accuracy of frequency deviation calibrations of FM transmitters. Measures deviation over a range from 0 to 1,000 KHZ at frequencies from 20 to 1,000 MHZ.

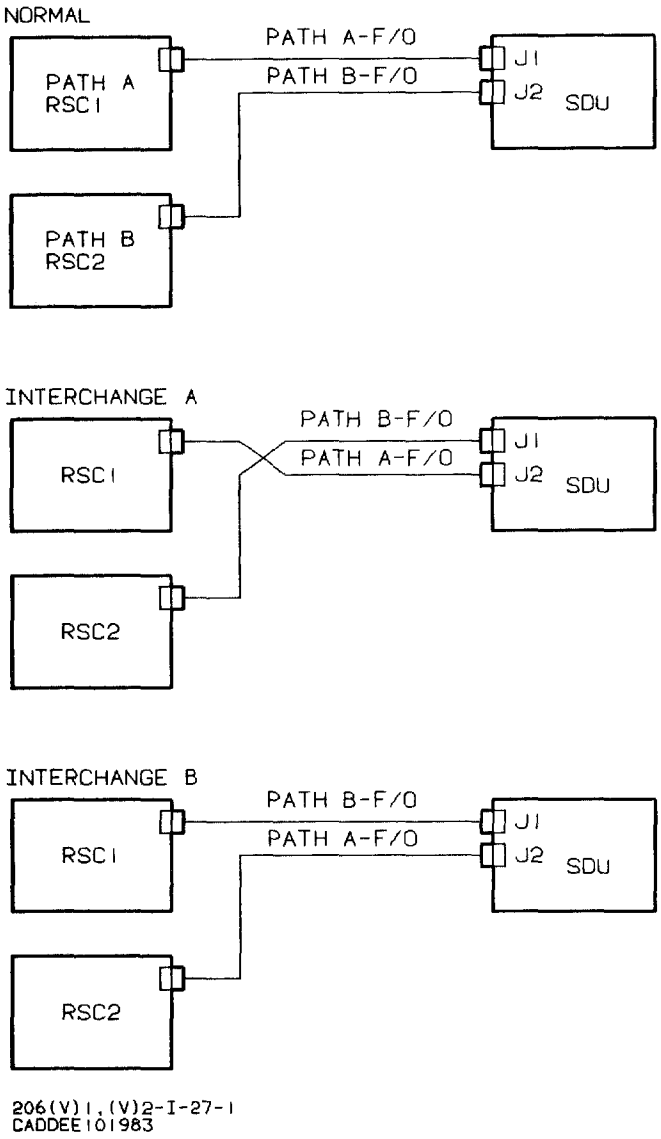


Figure 5-1. Interchange Procedure (Sheet 1 of 4)

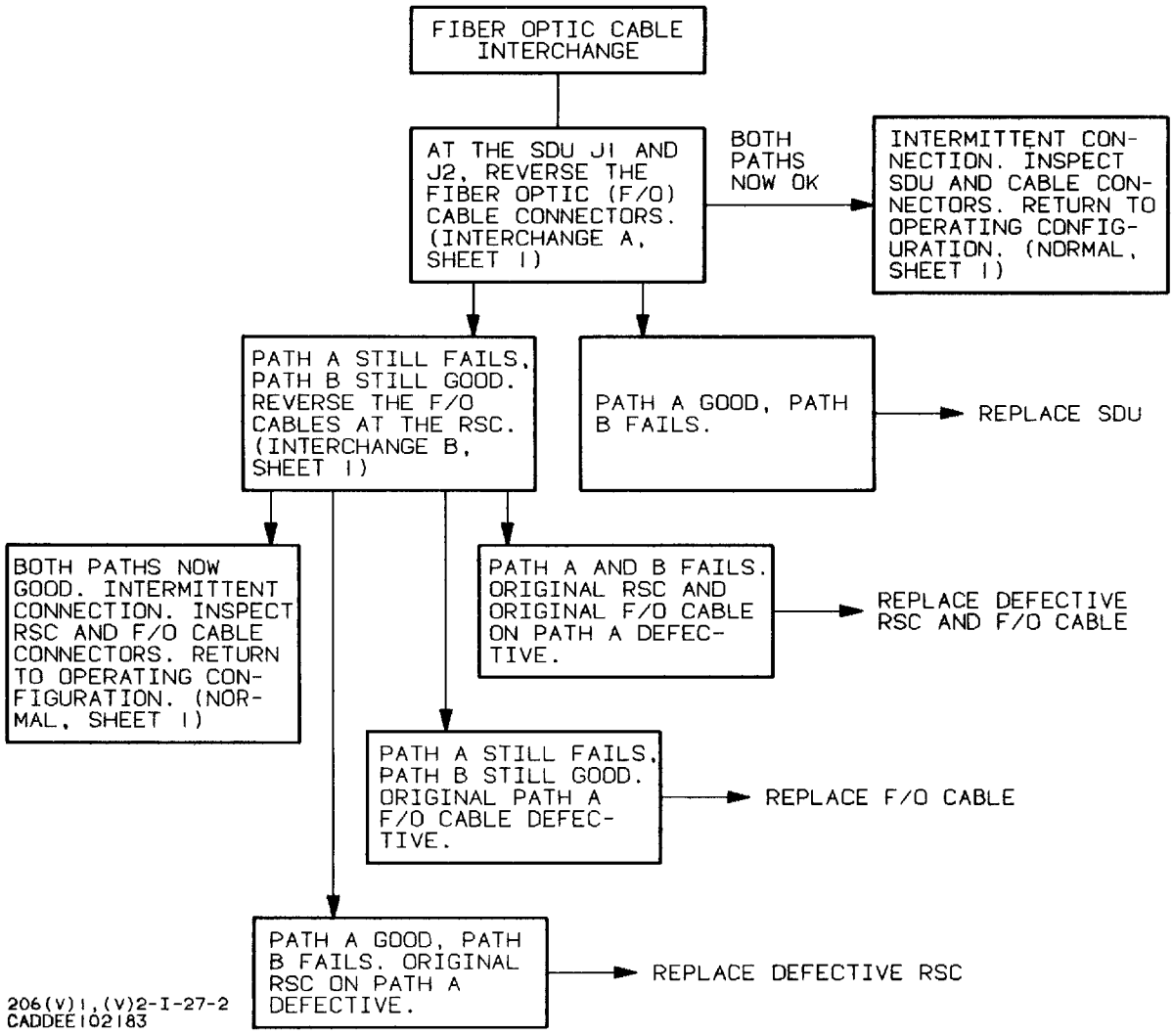


Figure 5-1. Interchange Procedure (Sheet 2 of 4)

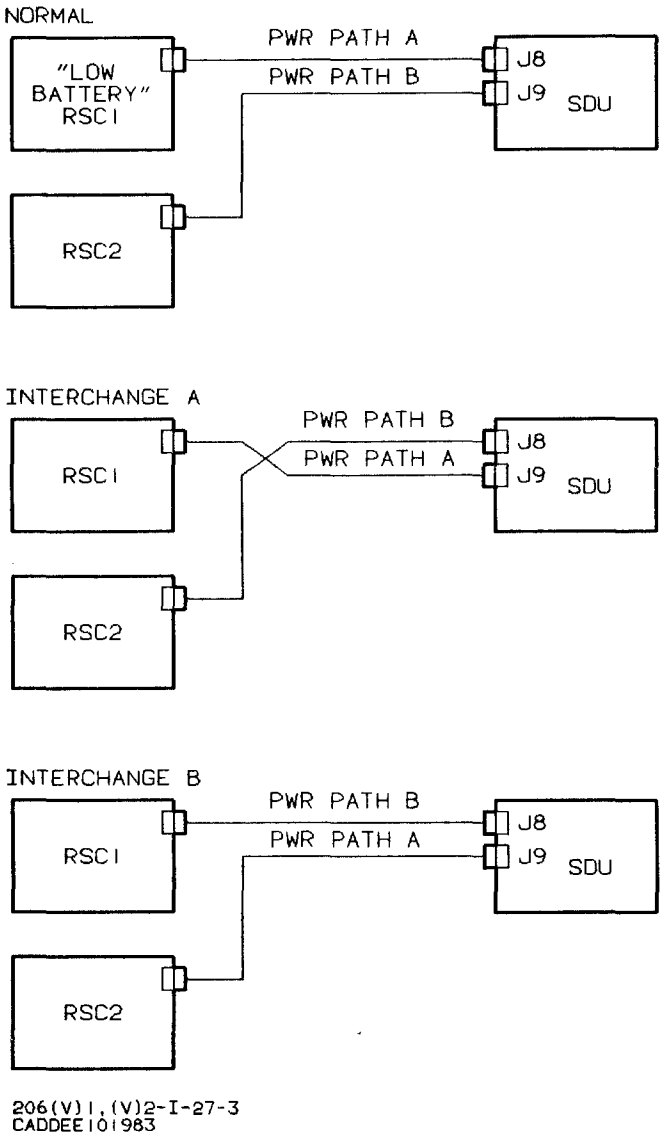
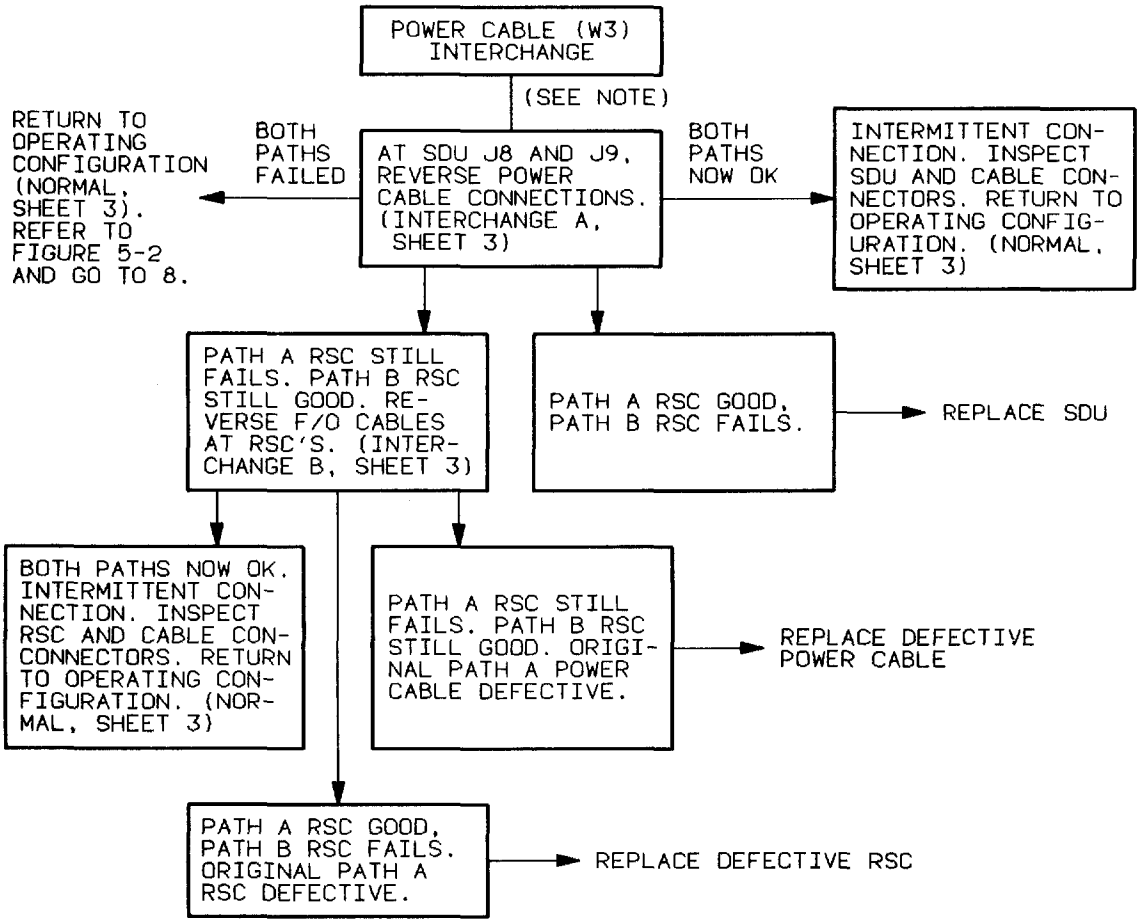


Figure 5-1. Interchange Procedure (Sheet 3 of 4)



NOTES:

1. FOR THE PURPOSE OF TROUBLESHOOTING WITH THE INTERCHANGE PROCEDURE, THE FAILED PATH IS THE "A" PATH.
2. FOR POWER CABLE INTERCHANGE FAILED IS DEFINED AS A "LOW BATTERY" INDICATION AT THE RSC.

206(V)1,(V)2-I-27-4
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Figure 5-1. Interchange Procedure (Sheet 4 of 4)

Table 5-2. Trouble Analysis Symptom List

Symptom	Trouble analysis start point
System does not operate, does not function or will not power up	Go to 8
System remote control does not function for one or both RSC's	Go to 1
HF-SSB subsystem does not function	Go to 5
VHF-FM subsystem does not function	Go to 6
VHF-AM subsystem does not function	Go to 7
UHF-AM subsystem does not function	Go to 7
KY-65, (AN/GRC-206(V)1 only) does not function	Go to 9
KY-57, (AN/GRC-206(V)1 only) does not function	Go to 11

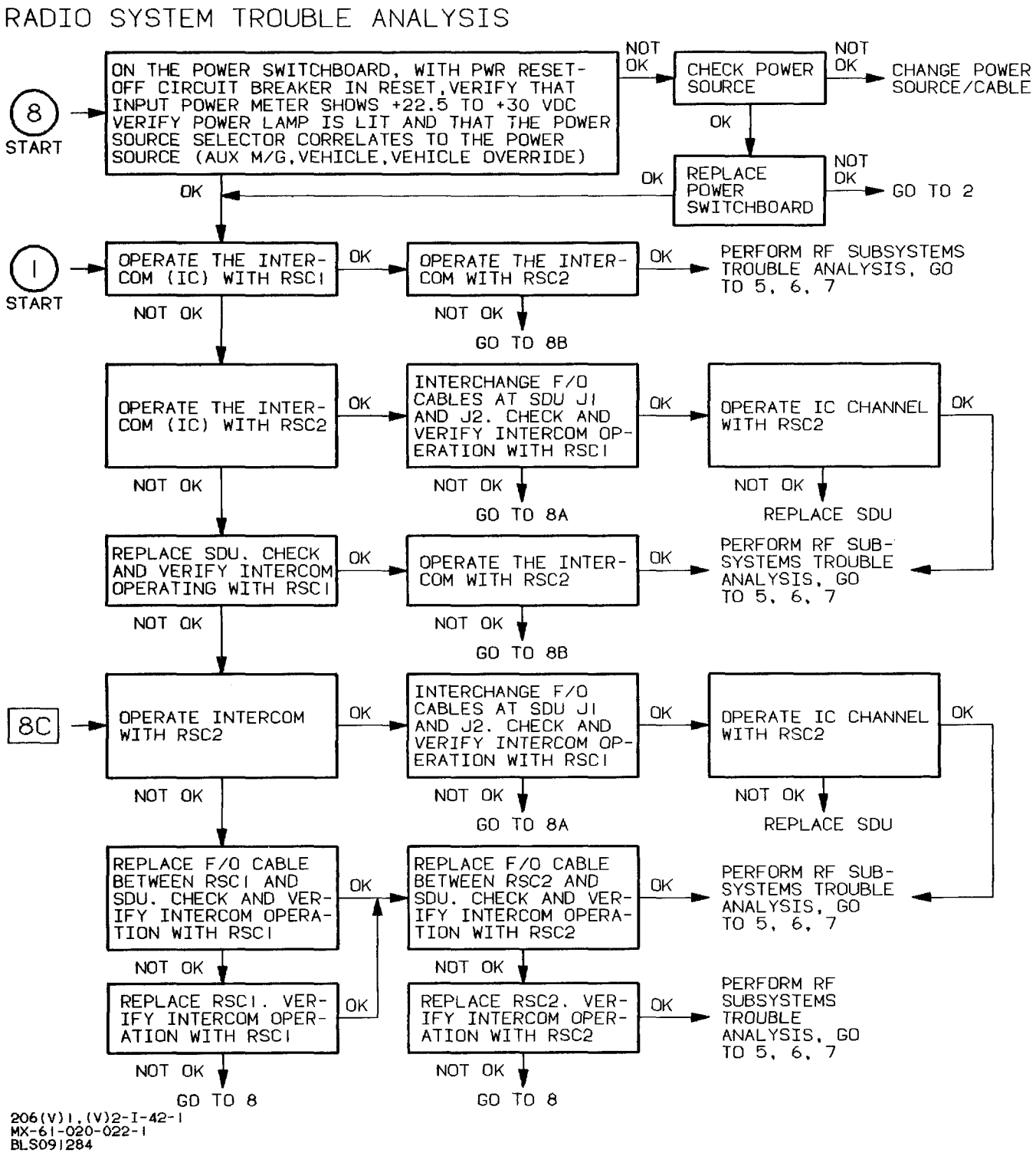


Figure 5-2. Radio System Trouble Analysis Diagram
(Sheet 1 of 12)

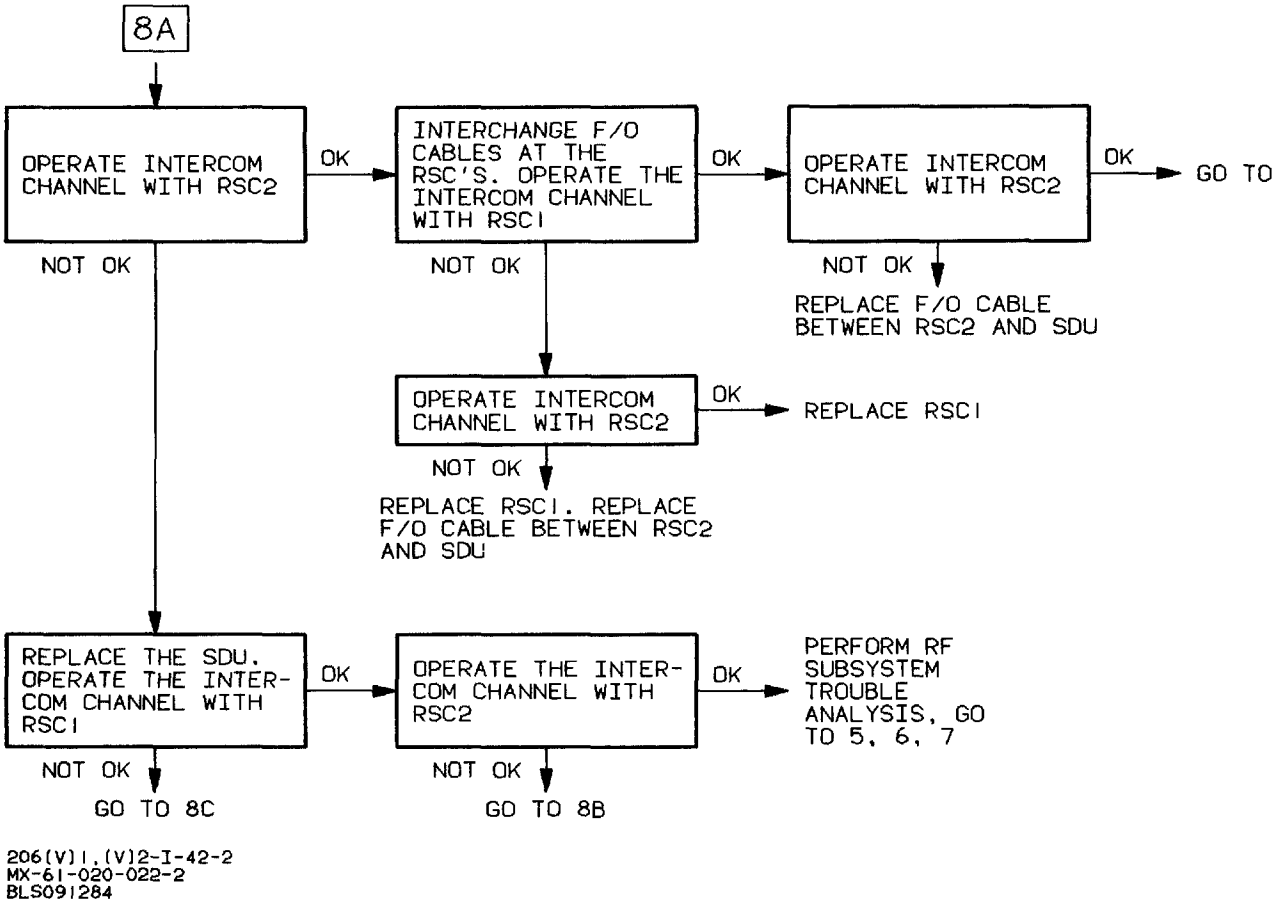


Figure 5-2. Radio System Trouble Analysis Diagram
(Sheet 2 of 12)

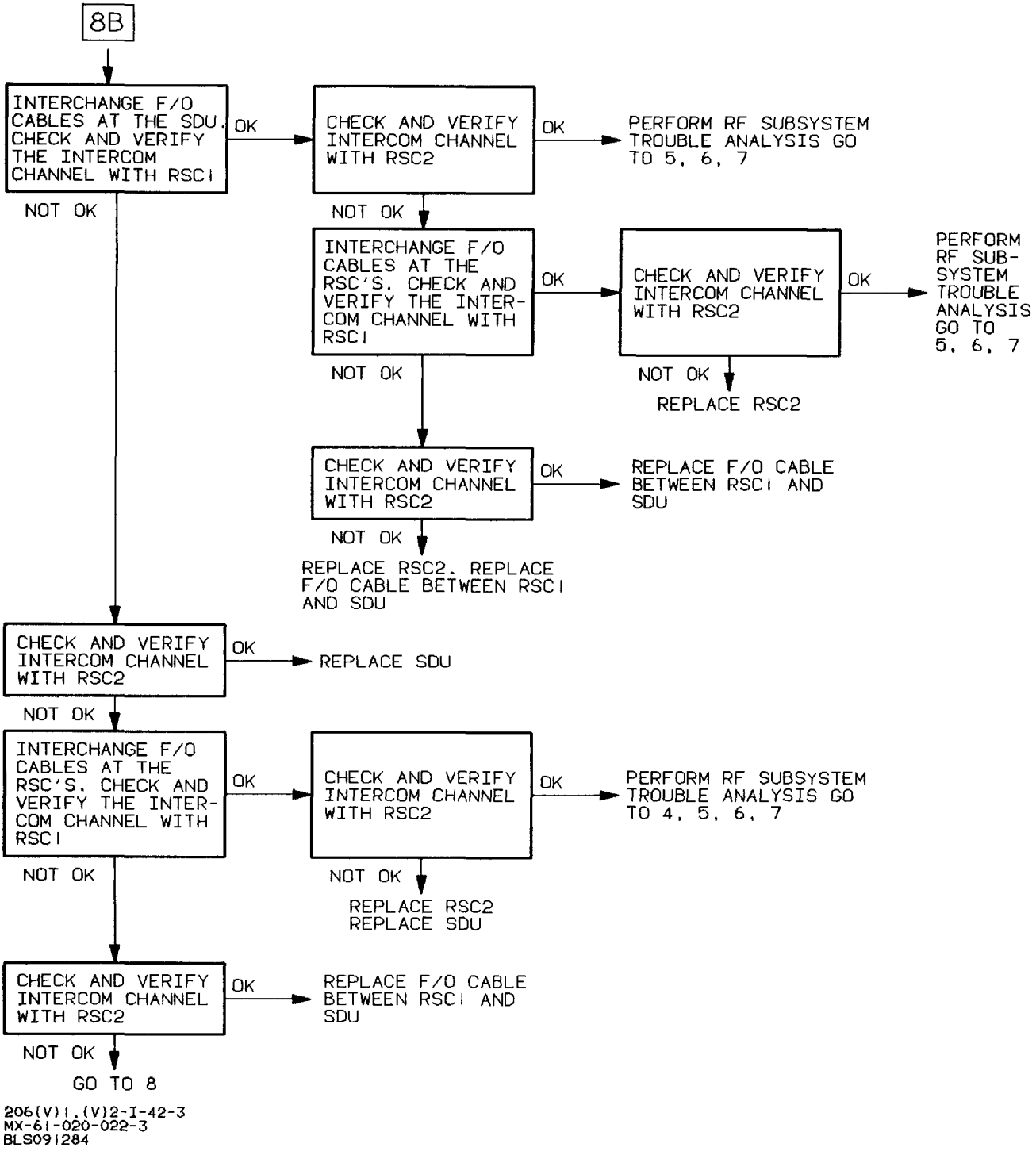


Figure 5-2. Radio System Trouble Analysis Diagram
(Sheet 3 of 12)

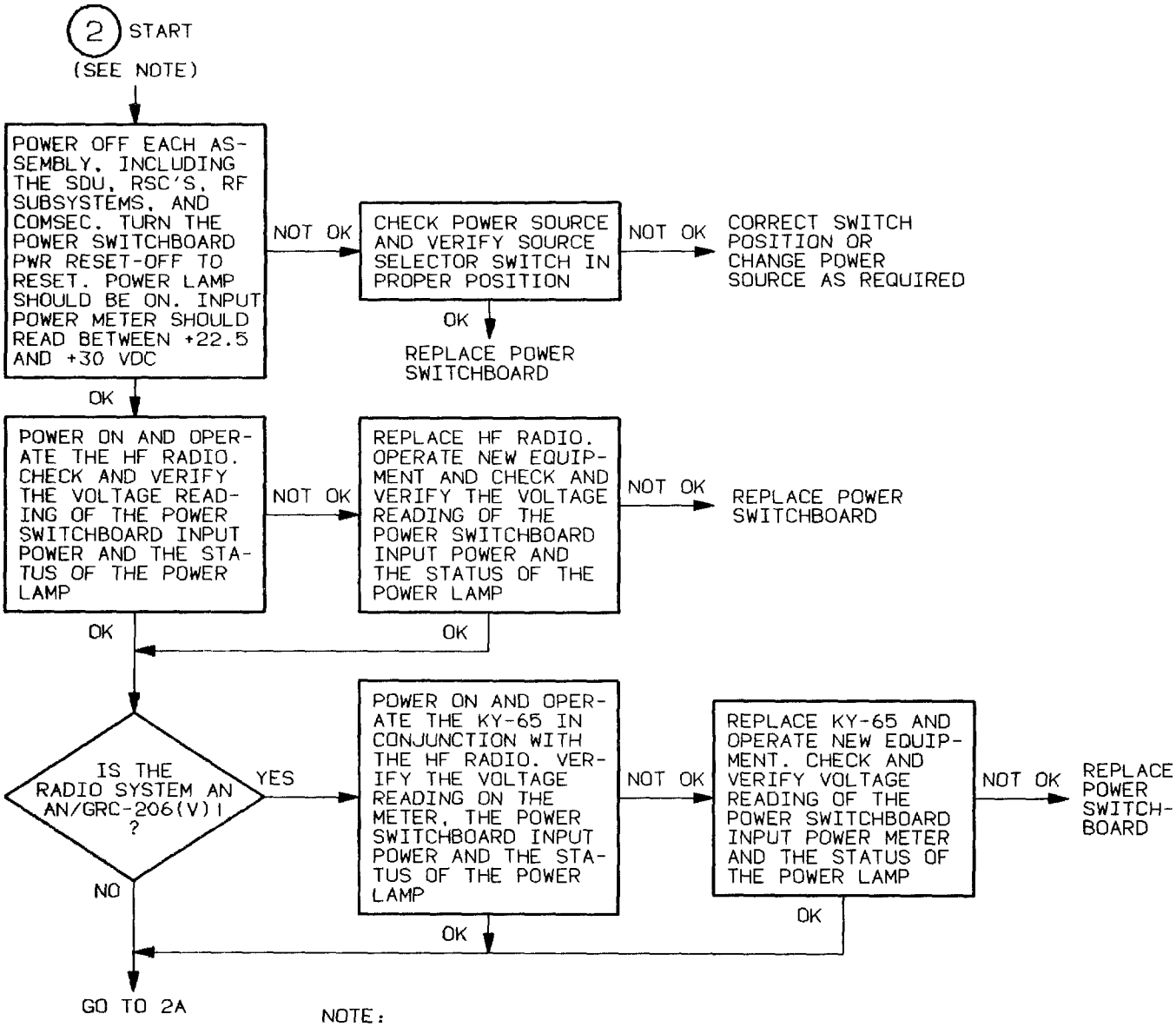


Figure 5-2. Radio System Trouble Analysis Diagram
(Sheet 4 of 12)

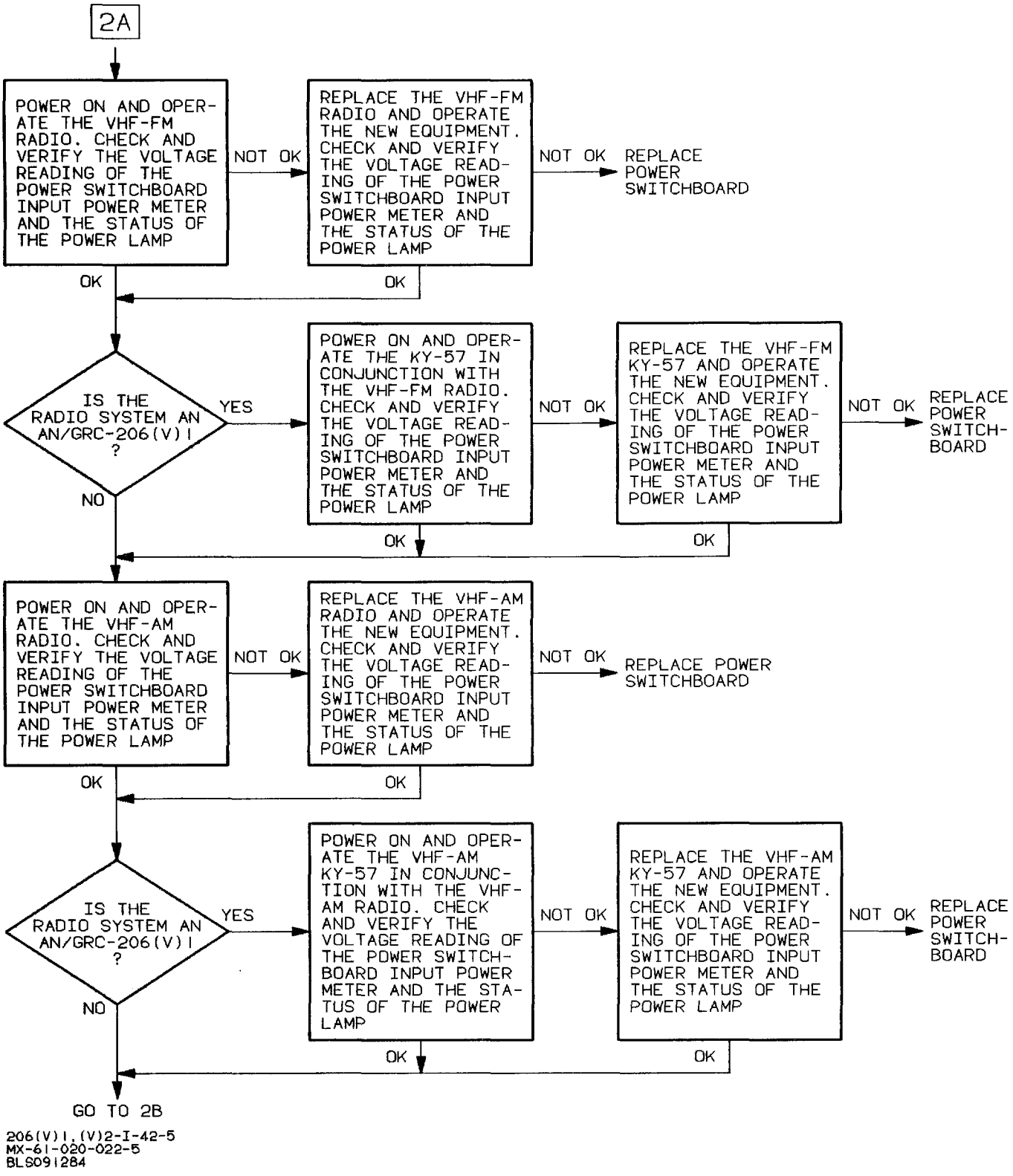


Figure 5-2. Radio System Trouble Analysis Diagram
(Sheet 5 of 12)

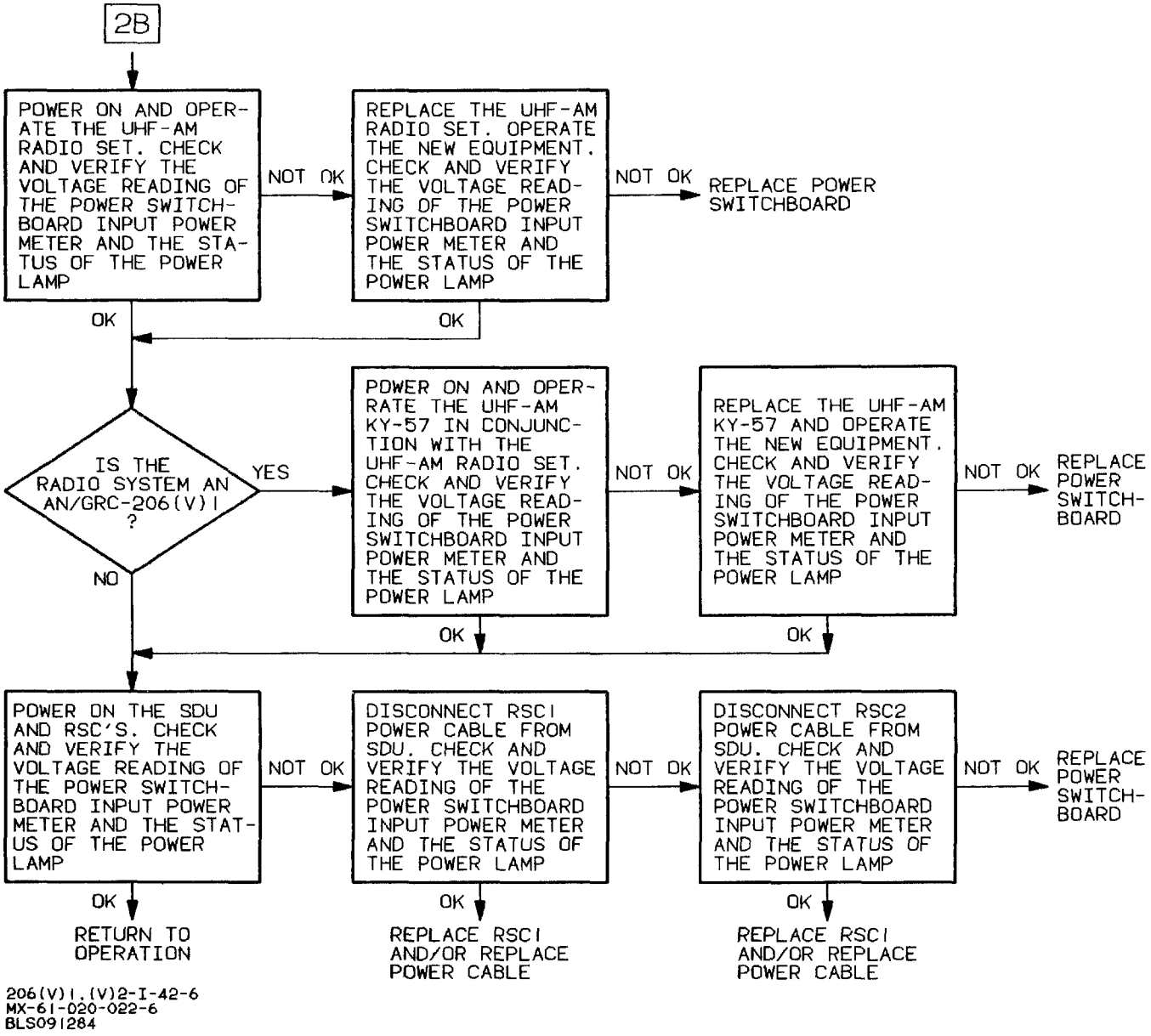
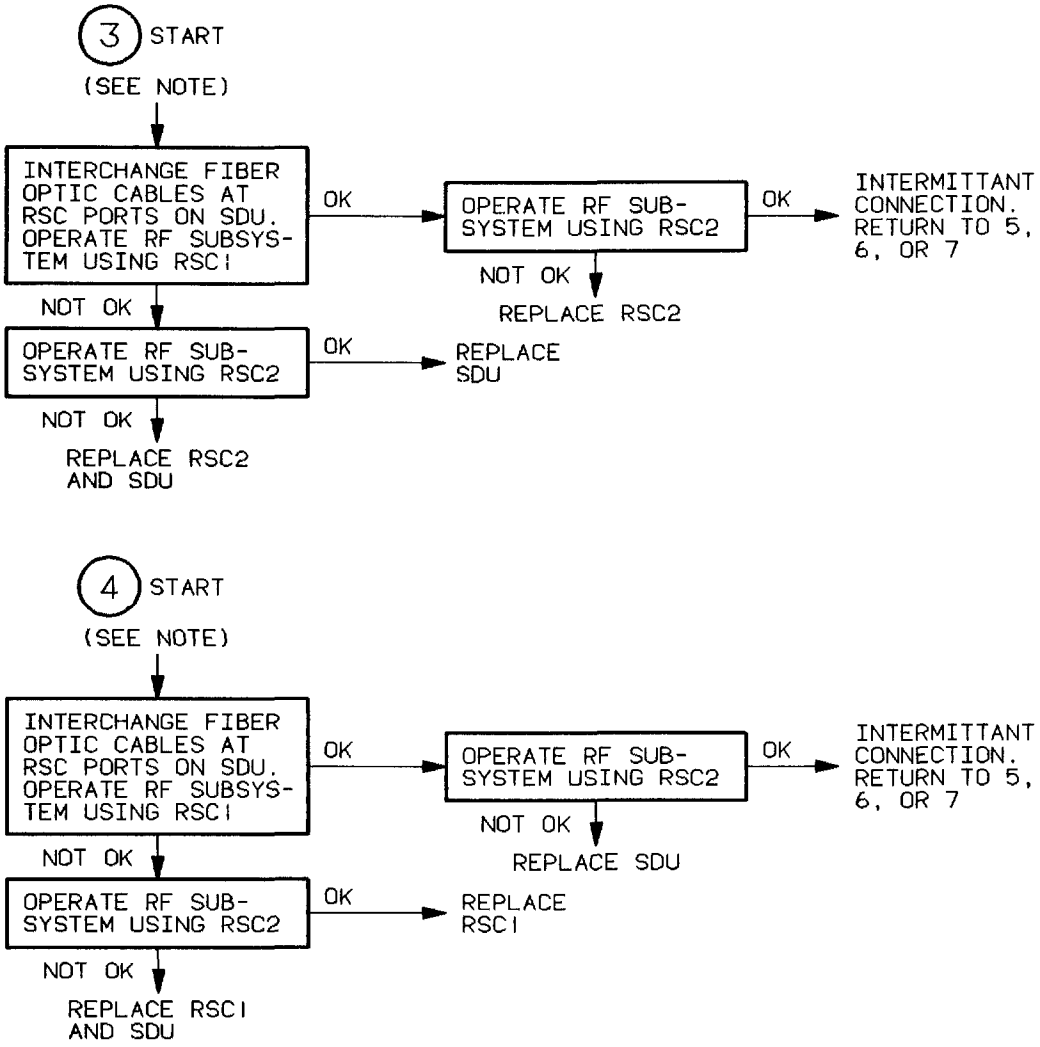


Figure 5-2. Radio System Trouble Analysis Diagram
(Sheet 6 of 12)



NOTE:

PRIOR TO PERFORMANCE OF TROUBLE ANALYSIS 3 OR 4, MARK THE FIBER OPTIC (F/O) CABLE AND THE RSC ATTACHED TO THE RSC1 PORT ON THE SDU AS CABLE 1 AND RSC1. MARK THE OTHER CABLE AS CABLE 2 AND RSC2.

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MX-61-020-022-7
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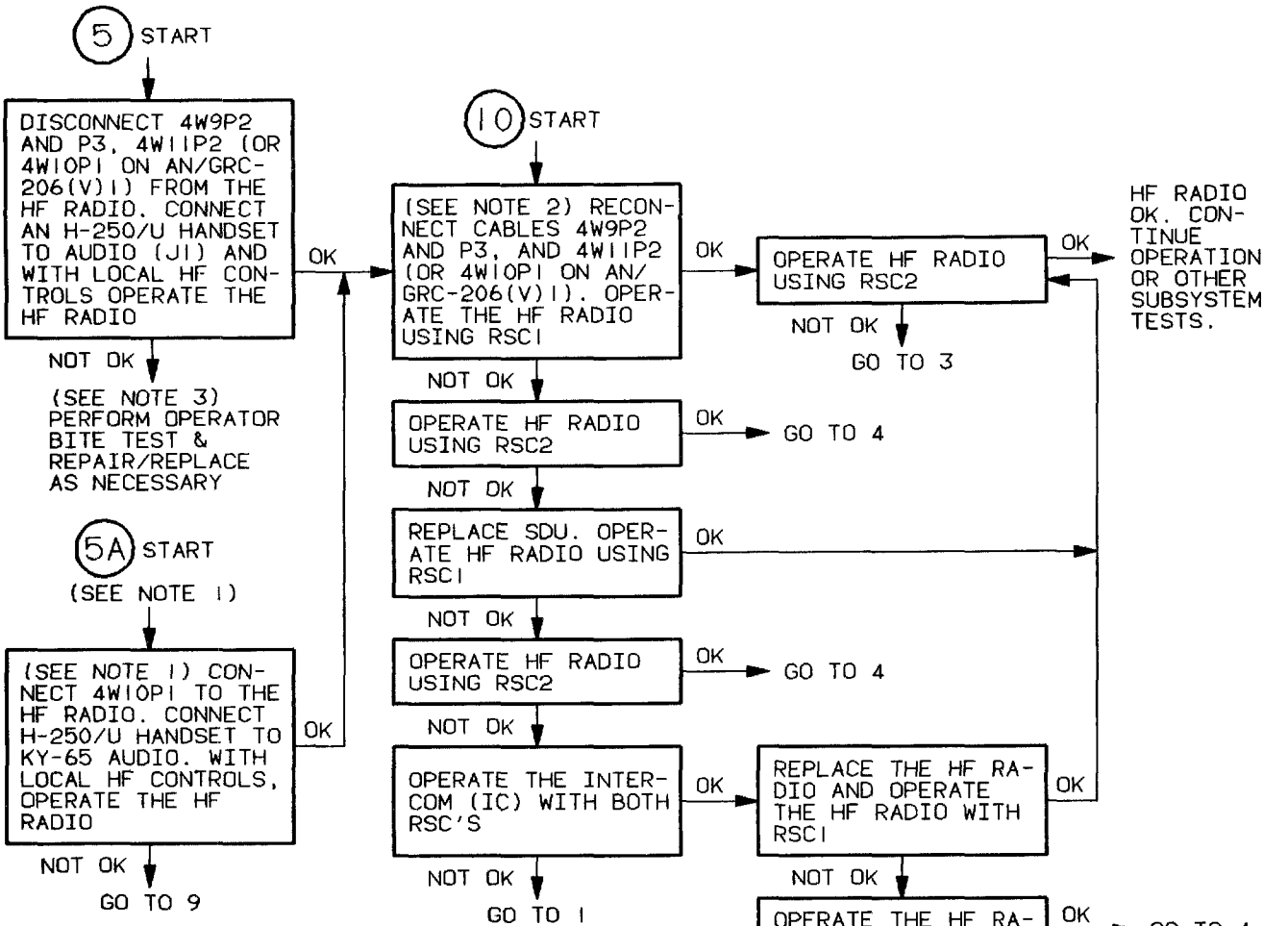
Figure 5-2. Radio System Trouble Analysis Diagram (Sheet 7 of 12)



NOTES:

1 STEP 5A NEED BE PERFORMED ON AN/GRC-206(V)1 ONLY. PROPER COMSEC OPERATING PROCEDURES IN SECURE VOICE MODE MUST BE FOLLOWED.

2 REFER TO FIGURE FO-7 FOR CABLE CONNECTIONS FOR SECURE AND NONSECURE OPERATIONS.

3 THE MONITOR/TEST DISPLAY WILL SHOW THE FOLLOWING BITE READOUTS FOR EQUIPMENT REPAIR/REPLACED BY THE OPERATOR.

F - INVALID FREQUENCY. ENTER FREQUENCY BETWEEN 2.0000 AND 29.9999 MHZ. CONFIRM FREQUENCY ENTRY.

b - LOW PRIMARY POWER. CHECK SWITCHBOARD AND SOURCE POWER.

E - EXCITER RF OUTPUT LOW. REPLACE RT-1444.

. - (DECIMAL) POWER CONDITIONER FAULTY. REPLACE AM-7148.

- - (CENTER BAR) +5 VDC FAULT. REPLACE AM-7148.

A - AMPLIFIER COUPLER OR ANTENNA FAULT. RUN MODULE TEST. IF COUPLER OK REPLACE ANTENNA. IF NOT OK REPLACE AM-7148.

L - NORMAL INDICATION WHEN PTT IS KEYED AND NO MODULATION IS PRESENT. IF MODULATION SHOULD BE PRESENT, DISPLAY FLASHES BETWEEN □ AND L; IF DISPLAY IS NOT INDICATING □, ATTEMPT SPEAKING LOUDER INTO HANDSET OR REPLACE HANDSET. IF UNABLE TO MODULATE REPLACE RT-1444.

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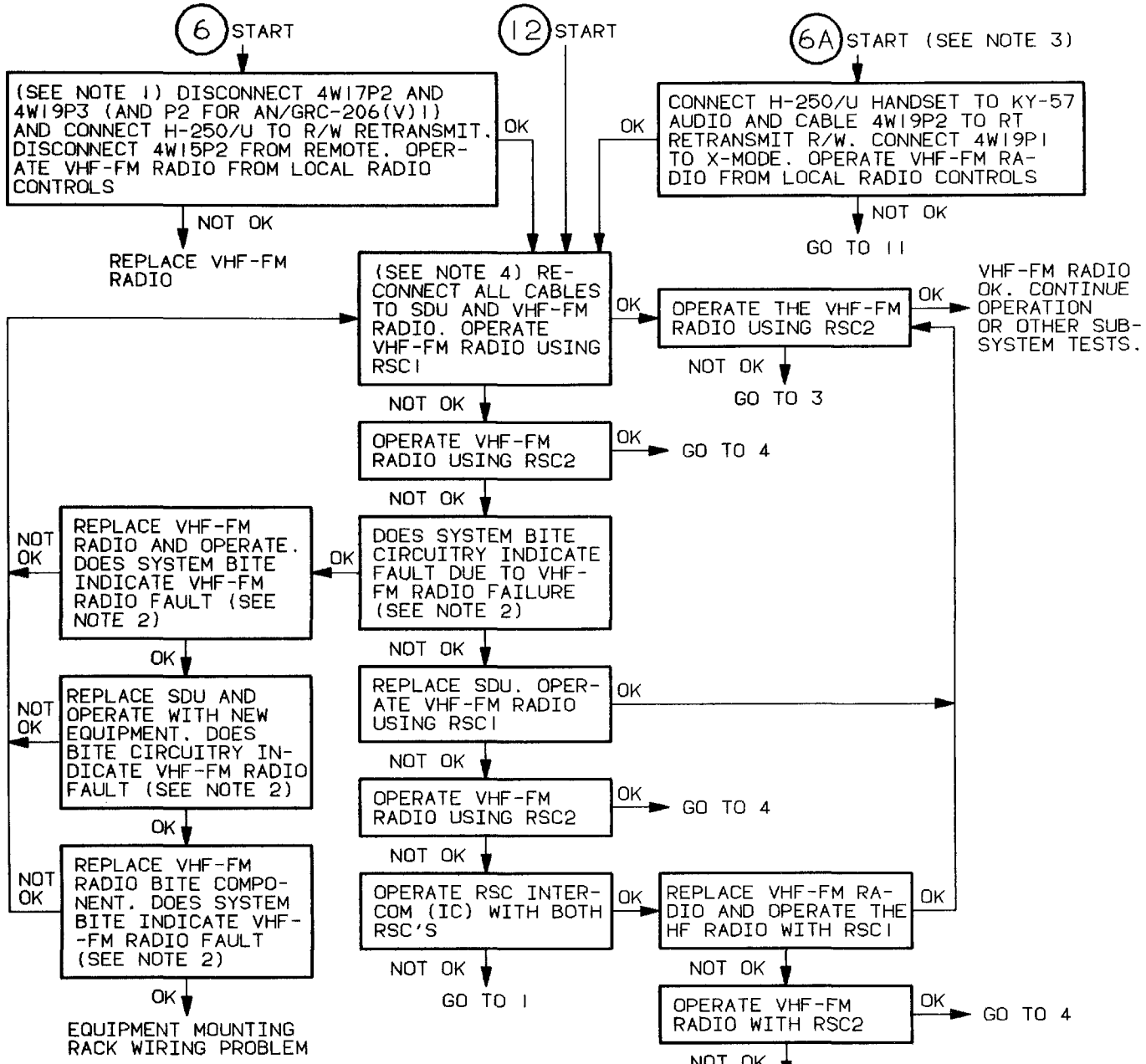
Figure 5-2. Radio System Trouble Analysis Diagram
(Sheet 8 of 12)



NOTES:

1 REPLACE X-MODE CONNECTOR COVER. COVER CONTAINS JUMPER FOR NONSECURE OPERATION.

2 STATUS DISPLAY INDICATES FAULT FOR ALL RF SUBSYSTEMS FAILURES. HOWEVER, VHF/UHF-AM RADIO SETS HAVE FAULT LAMPS TO INDICATE FAILURES. THE HF RADIO HAS A MONITOR/TEST DISPLAY TO INDICATE EQUIPMENT FAILURE.

3 STEP 6A IS APPLICABLE TO RADIO COMMUNICATION SYSTEM AN/GRC-206(V)1 ONLY.

4 REFER TO FIGURE FO-7 FOR CABLE CONNECTIONS FOR SECURE AND NONSECURE OPERATIONS.

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Figure 5-2. Radio System Trouble Analysis Diagram
(Sheet 9 of 12)

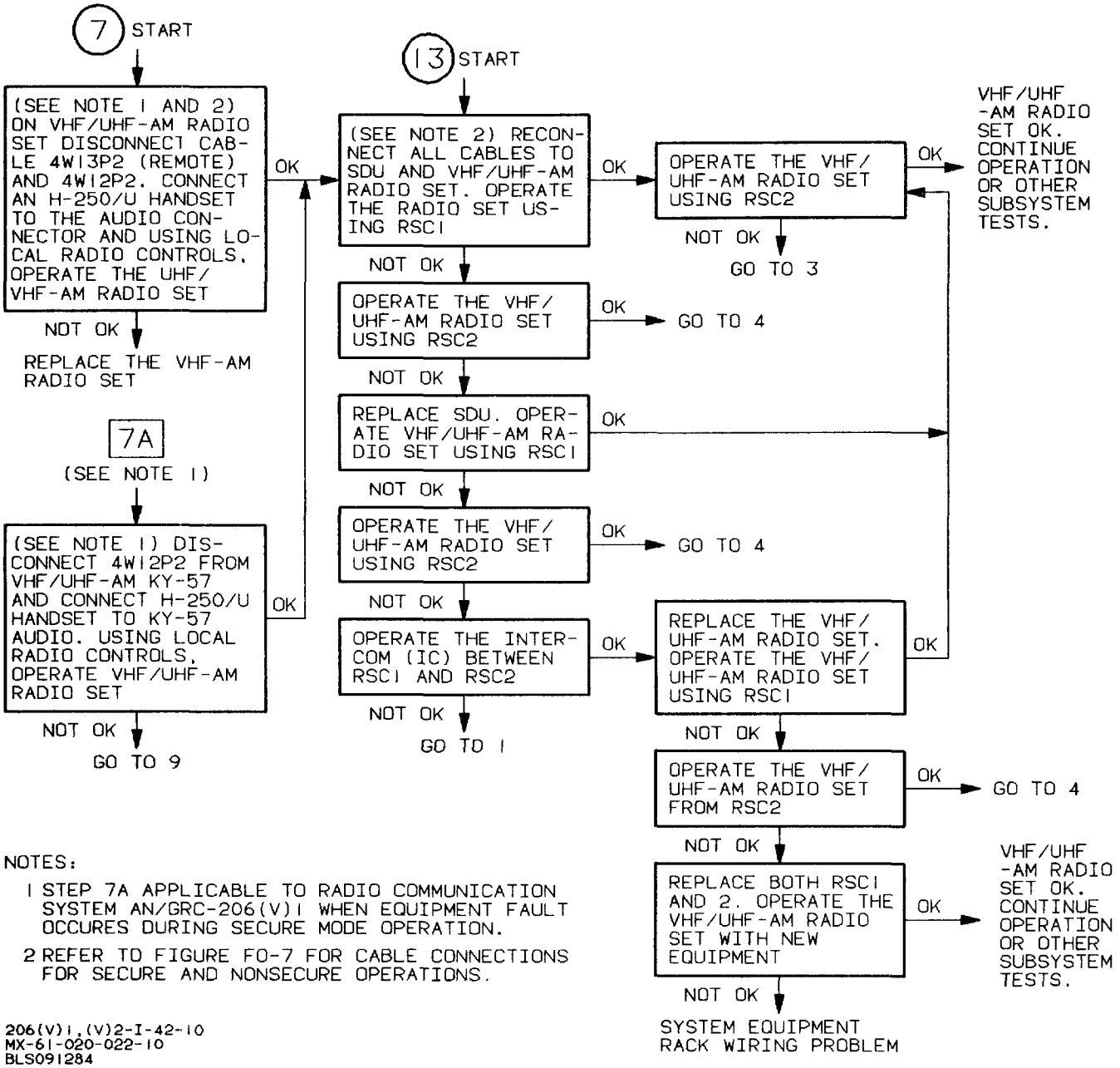
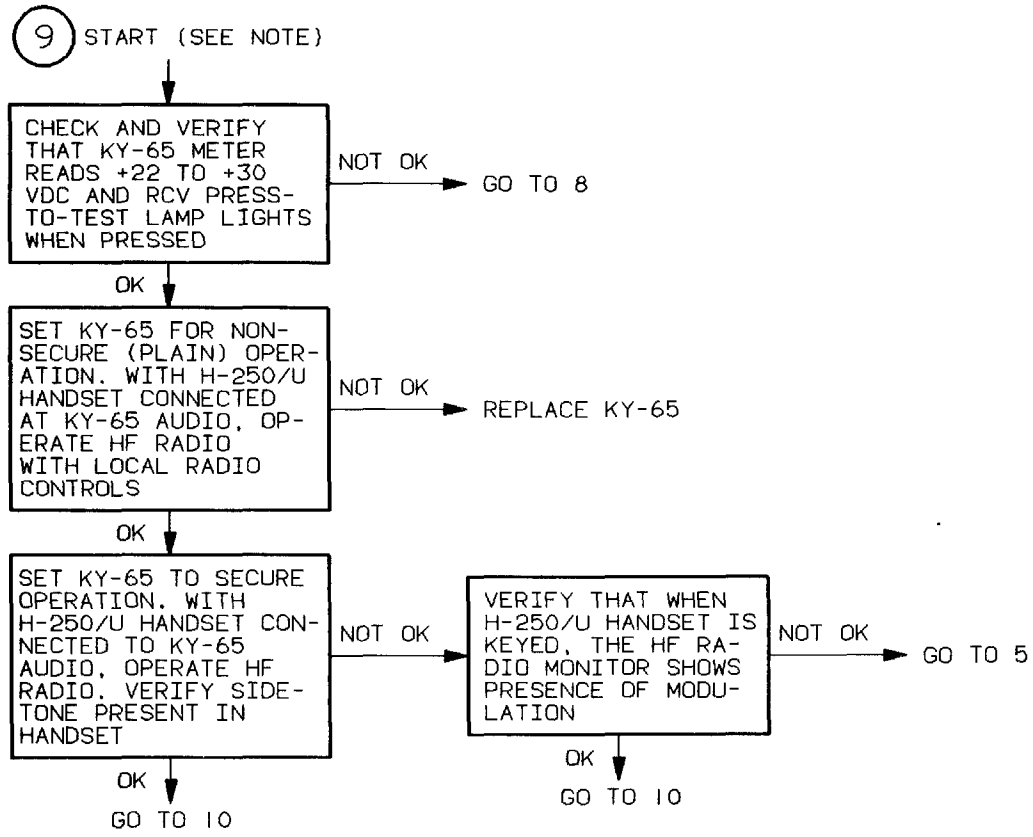


Figure 5-2. Radio System Trouble Analysis Diagram
(Sheet 10 of 12)



NOTE:

IF SYSTEM HAS KY-65, PRESENCE OF RED OPERATING VOLTAGE CAN BE VERIFIED FROM THE METER MOUNTED ON THE FRONT PANEL OF THE KY-65 AND BY PRESSING THE KY-65 RCV LAMP HOLDER. REFER TO COMSEC MANUALS FOR PROPER OPERATING PROCEDURES

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Figure 5-2. Radio System Trouble Analysis Diagram
(Sheet 11 of 12)

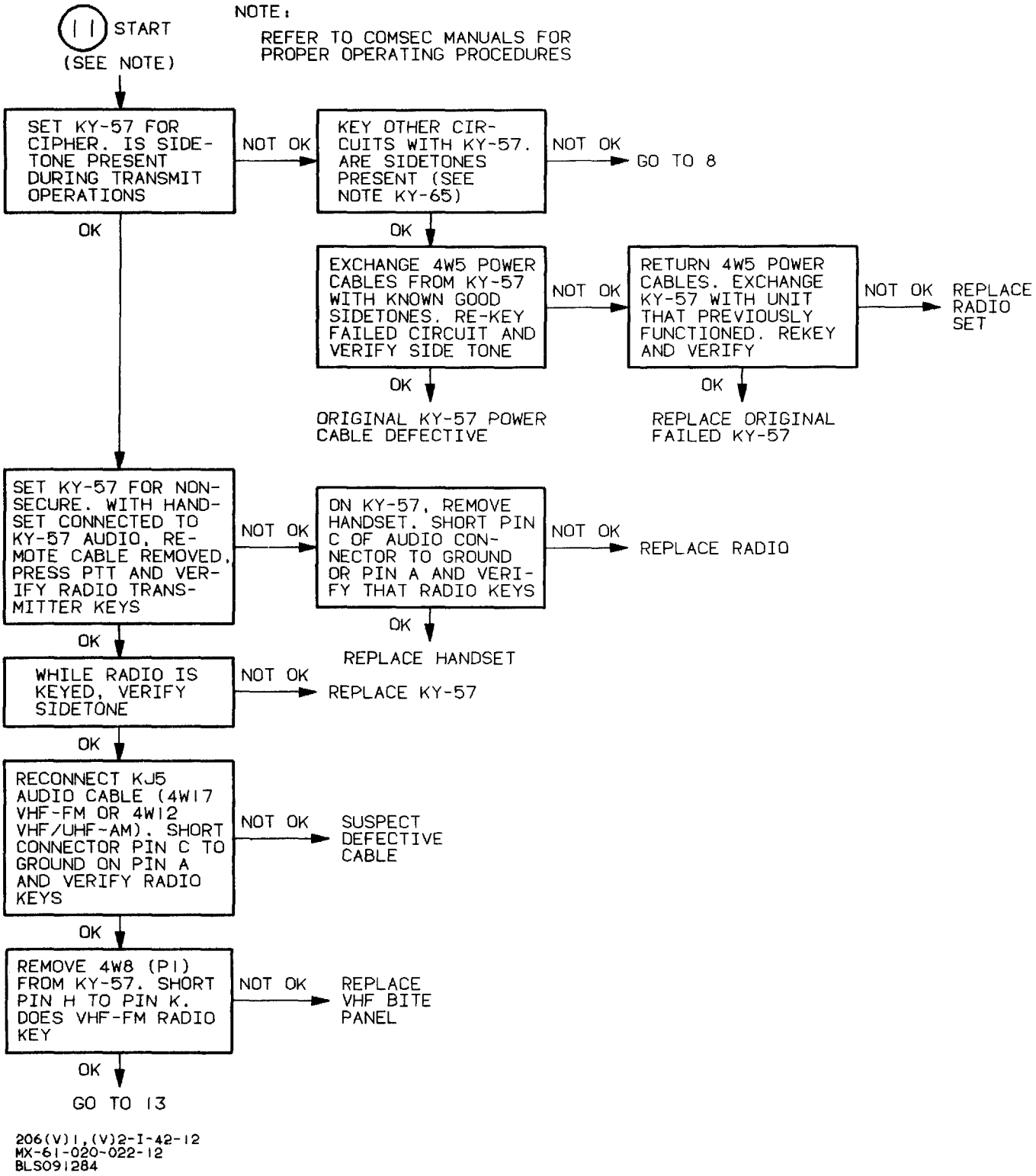


Figure 5-2. Radio System Trouble Analysis Diagram
(Sheet 12 of 12)

c. Troubleshooting. Troubleshooting the SDU consists of performing the procedures in figure 5-4 to isolate a fault to a replaceable assembly. The preliminary test setup procedures (steps a and b) required for the operational checkout must be performed prior to starting the troubleshooting procedures. In addition to the equipment shown in figure 5-3, the AN/GVM-9 power supply extender assembly should be used to monitor the SDU power supply voltages during troubleshooting. Use the disassembly and reassembly procedures to replace the indicated assembly.

d. Disassembly. Disassembly of the SDU is accomplished in accordance with the following procedures. See figure 5-6 for location of assemblies.

CAUTION

Assemblies A1, A2, A3, A4, A5 and fiber optic module A8/A9 contain electrostatic discharge sensitive (ESDs) devices. Use appropriate precautions while handling these assemblies.

(1) Loosen eight captive screws on SDU top cover and lift off top cover.

(2) To remove assemblies A2 through A5, proceed as follows:

(a) Simultaneously lift-up two circuit card ejectors on assembly being removed until it disconnects from motherboard connector.

(b) Carefully pull assembly from SDU case.

(3) To remove assembly A1, proceed as follows:

(a) Disconnect connectors W1P2, W2P2, and P3 from assembly A1.

(b) Simultaneously lift-up circuit card ejectors on assembly A1 until it disconnects from motherboard connector.

(c) Carefully pull assembly A1 up and out of SDU case.

(4) To remove assembly A6, proceed as follows:

(a) Loosen four captive screws securing assembly A6 bracket to SDU case.

(b) Simultaneously lift-up on two circuit card ejectors to disconnect assembly (A6) from motherboard (A7).

(c) Lift assembly A6 from SDU case.

(5) To remove assembly A8, proceed as follows:

(a) Remove assemblies A2 and A1; refer to steps (2) and (3), respectively.

(b) Disconnect W1P1 from assembly A8.

(c) Remove jam nut (and attaching parts) from RSC-1 fiber optic connector (J1) on SDU front panel.

(d) Carefully remove assembly A8 from SDU case.

(6) To remove assembly A9, proceed as follows:

(a) Remove assemblies A2 and A1, refer to steps (2) and (3), respectively.

(b) Disconnect W2P1 from assembly A9.

(c) Remove jam nut (and attaching parts) from RSC-2 fiber optic connector (J2) on SDU front panel.

(d) Carefully remove assembly A9 from SDU case.

(7) To remove assembly A7, proceed as follows:

(a) Remove assemblies A1 through A6.

(b) Loosen eight captive screws on SDU bottom cover. Remove SDU bottom cover.

(c) Disconnect P1 and P2 from A7J1 and J2, respectively.

(d) Remove ten (10) screws and washers from assembly A7. Lift assembly A7 straight up to clear guide pins on case assembly.

e. Reassembly. Reassembly of the SDU is accomplished in accordance with the following procedures. See figure 5-6 for location of assemblies.

CAUTION

Assemblies A1, A2, A3, A4, A5 and fiber optic module A8/A9 contain electrostatic discharge sensitive (ESDS) devices. Use appropriate precautions while handling these assemblies.

(1) To install assembly A7, proceed as follows:

(a) Position assembly A7 on bottom of SDU. Install and alternately tighten ten (10) screws and washers to secure assembly A7 to the SDU case assembly.

(b) Connect P1 and P2 to A7J1 and J2, respectively.

(c) Position bottom cover on SDU case assembly. Alternately tighten eight captive screws.

(d) Install assemblies A1 through A6.

NOTE

Apply a thin film of grease per MIL-G-4343 to O-ring of assemblies A8 and A9 prior to installation.

(2) To install assembly A9, proceed as follows:

(a) Remove assemblies A1 and A2, if installed (refer to disassembly procedures).

(b) Position assembly A9 so that fiber optic connector will side through RSC-2 connector (J2) opening in SDU front (inside) panel.

(c) Slide assembly A9 forward until it rest against front panel. Install dust cap and jam nut; tighten jam nut to 15 foot pounds.

(d) Install assembly A1 and A2; connect W2P1 to assembly A9.

(3) To install assembly A8, proceed as follows:

(a) Remove assemblies A1 and A2, if installed (refer to disassembly procedures).

(b) Position assembly A8 so that fiber optic connector will side through RSC-1 connector (J1) opening in SDU front (inside) panel.

(c) Slide assembly A8 forward until it rest against front panel. Install dust cap and jam nut; tighten jam nut to 15 foot pounds.

(d) Install assembly A1 and A2; connect W1P1 to assembly A8.

(4) To install assembly A1, proceed as follows:

(a) Align assembly A1 with its designated card slot.

(b) Slide assembly A1 into card slot until it rest against connector on inside bottom of SDU.

(c) Simultaneously apply downward pressure to two circuit card ejectors, insuring that assembly A1 is properly seated.

(d) Connect W1P2 to connector A1J3, W2P2 to connector A1J2, and P3 to connector A1J1.

(e) Ensure that W1P1 is connected to assembly A8 and W2P1 is connected to assembly A9.

(5) To install assemblies A2 through A5, proceed as follows:

(a) Align assembly to be installed with its designated card slot.

(b) Slide assembly into card slot until it rest against connector on inside bottom of SDU.

(c) Simultaneously apply downward pressure to two circuit card ejectors, insuring that assembly is properly seated.

(6) To install assembly A6, proceed as follows:

(a) Align assembly A6 with its designated card slot.

(b) Slide assembly A6 into card slot until it rest against connector on inside bottom of SDU.

(c) Simultaneously apply downward pressure to two circuit card ejectors; tighten four captive screws.

f. Testing. Test the SDU prior to installing it in the equipment mounting rack by performing the operational checkout procedure.

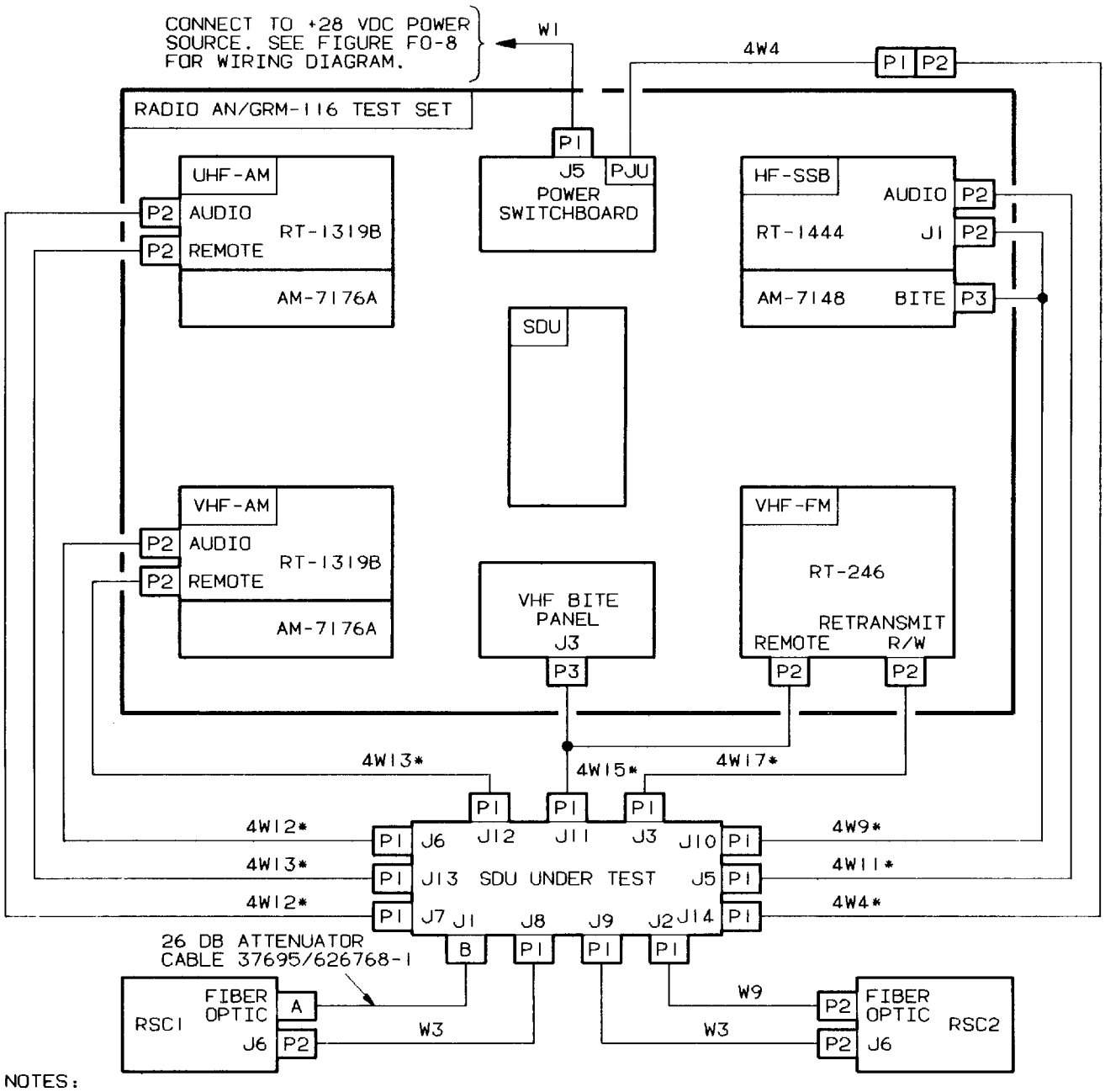
g. Cleaning. Due to the operating environment, the connectors of the fiber optic modules may require cleaning before and during operation. Clean the fiber optic module connectors as required. Refer to the fiber optic link maintenance procedures in paragraph 5-16.

h. Installation. Install the SDU in the equipment mounting rack in accordance with the following procedures. See figure 2-3 for component location.

(1) Position SDU in SDU-power switchboard mount and secure with two thumbscrews.

(2) Connect power cable 4W4 (P1) to connector J14 on SDU front panel.

(3) Refer to cabling diagram, figure FO-7, and make cable connections to meet desired Radio System configuration requirements.



NOTES:

1. CABLES SUFFIXED WITH AN ASTERISK * (e.g.4W13*) ARE PART OF THE ADAPTER CABLE TEST SET.
2. THE 26 DB ATTENUATOR CABLE (37695/626768-1) IS PART OF RECEIVER-TRANSMITTER AN/GVM-9 TEST SET.
3. CONNECT TEST EQUIPMENT AS REQUIRED IN TEST PROCEDURES.
4. REFER TO FIGURE FO-7 FOR CABLE CONNECTIONS BETWEEN GRM-116 TEST SET EQUIPMENTS. CONNECT GRM-116 TEST SET EQUIPMENT FOR NONSECURE VOICE OPERATION, OR SET COMSEC EQUIPMENT TO PLAIN TEXT.
5. INSURE THAT EACH RADIO SET IS CONNECTED TO A DUMMY LOAD CAPABLE OF DISSIPATING THE MAXIMUM POWER OUTPUT FROM THE RADIO SET.

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Figure 5-3. SDU Test Setup

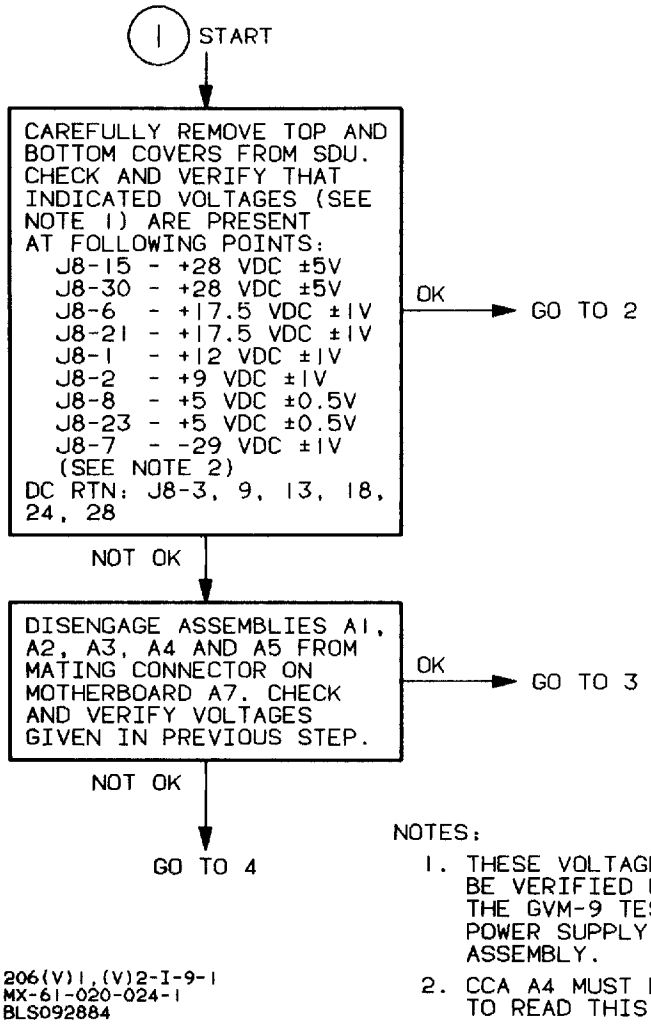
SYMPTOMS:

SDU DOES NOT OPERATE, DOES NOT FUNCTION OR WILL NOT POWER UP.....GO TO 1.

SDU REMOTE CONTROL FUNCTIONS FAULTY.....GO TO 7.

SDU AUDIO TROUBLE:
- INTERCOM AUDIO...GO TO 8.
- HF-SSB AUDIO.....GO TO 8.
- VHF-FM AUDIO.....GO TO 8.
- VHF-AM AUDIO.....GO TO 9.
- UHF-AM AUDIO.....GO TO 9.
- SUBSYSTEM(S) WILL NOT KEY TRANSMITTER....GO TO 9.

FULL OR PARTIAL LOSS OF ONE RSC.....GO TO 8A.



NOTES:
1. THESE VOLTAGES MAY BE VERIFIED USING THE GVM-9 TEST SET POWER SUPPLY EXTENDER ASSEMBLY.
2. CCA A4 MUST BE INSTALLED TO READ THIS VOLTAGE.

Figure 5-4. SDU Trouble Analysis Diagram (Sheet 1 of 9)

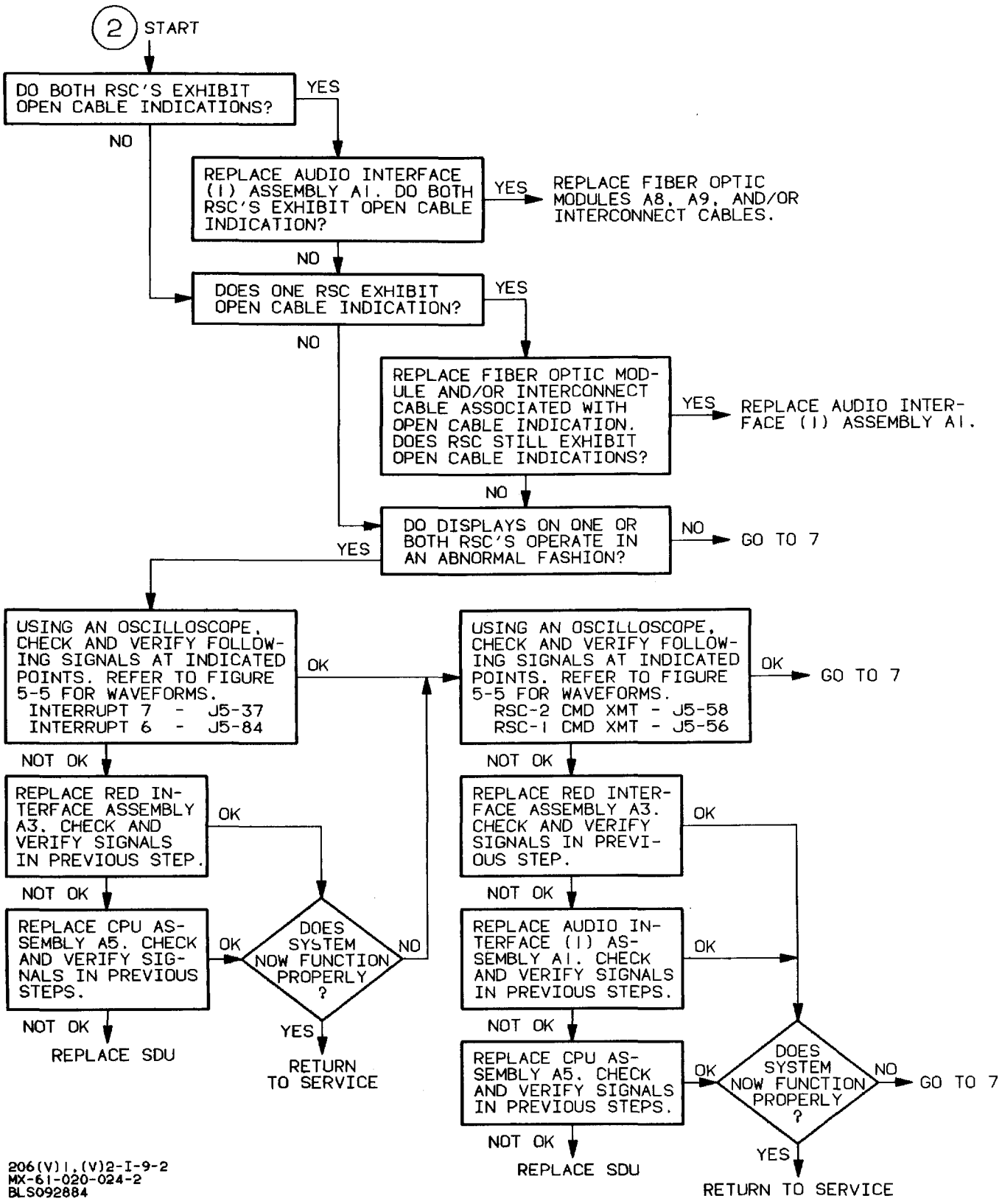


Figure 5-4. SDU Trouble Analysis Diagram (Sheet 2 of 9)

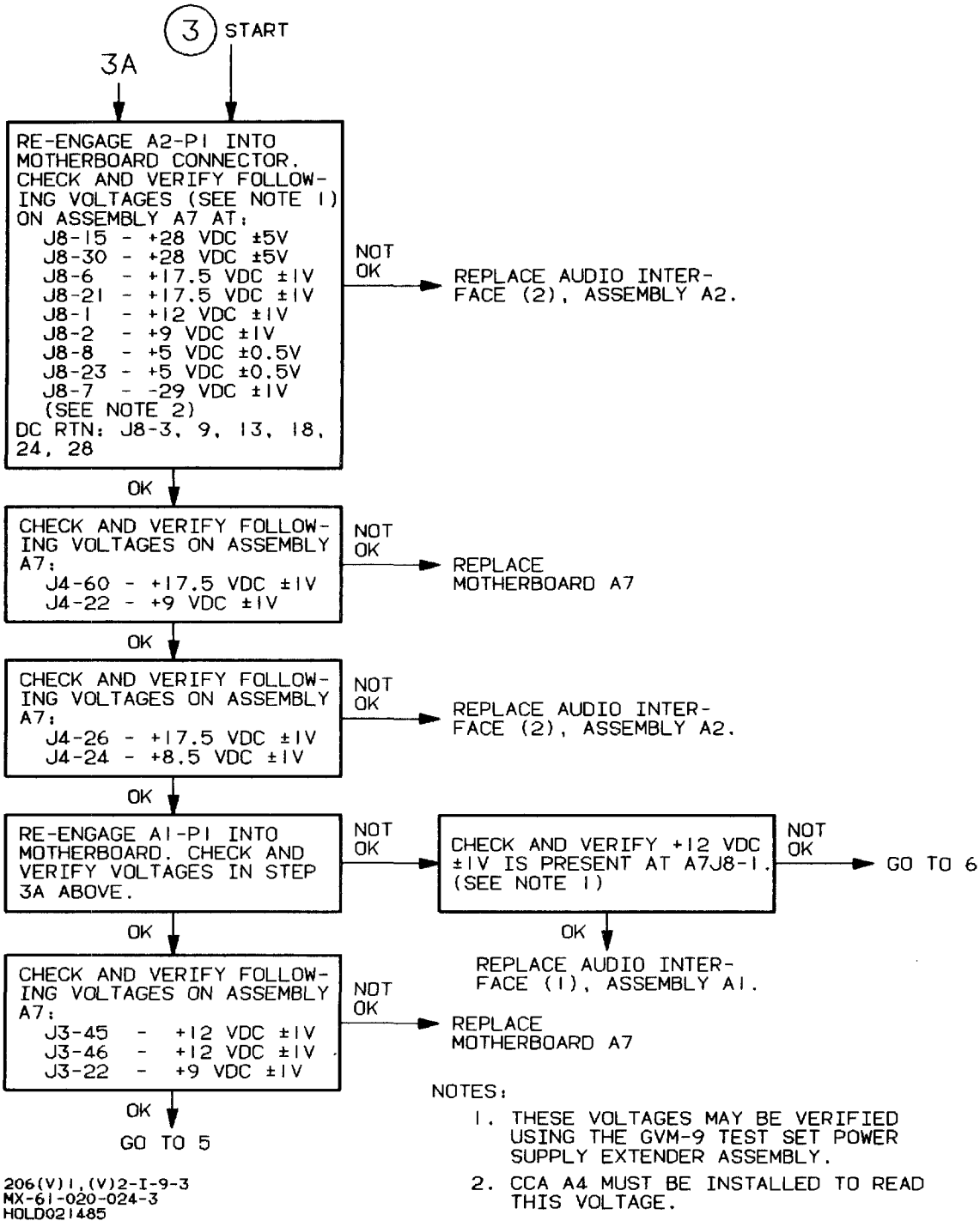


Figure 5-4. SDU Trouble Analysis Diagram (Sheet 3 of 9)

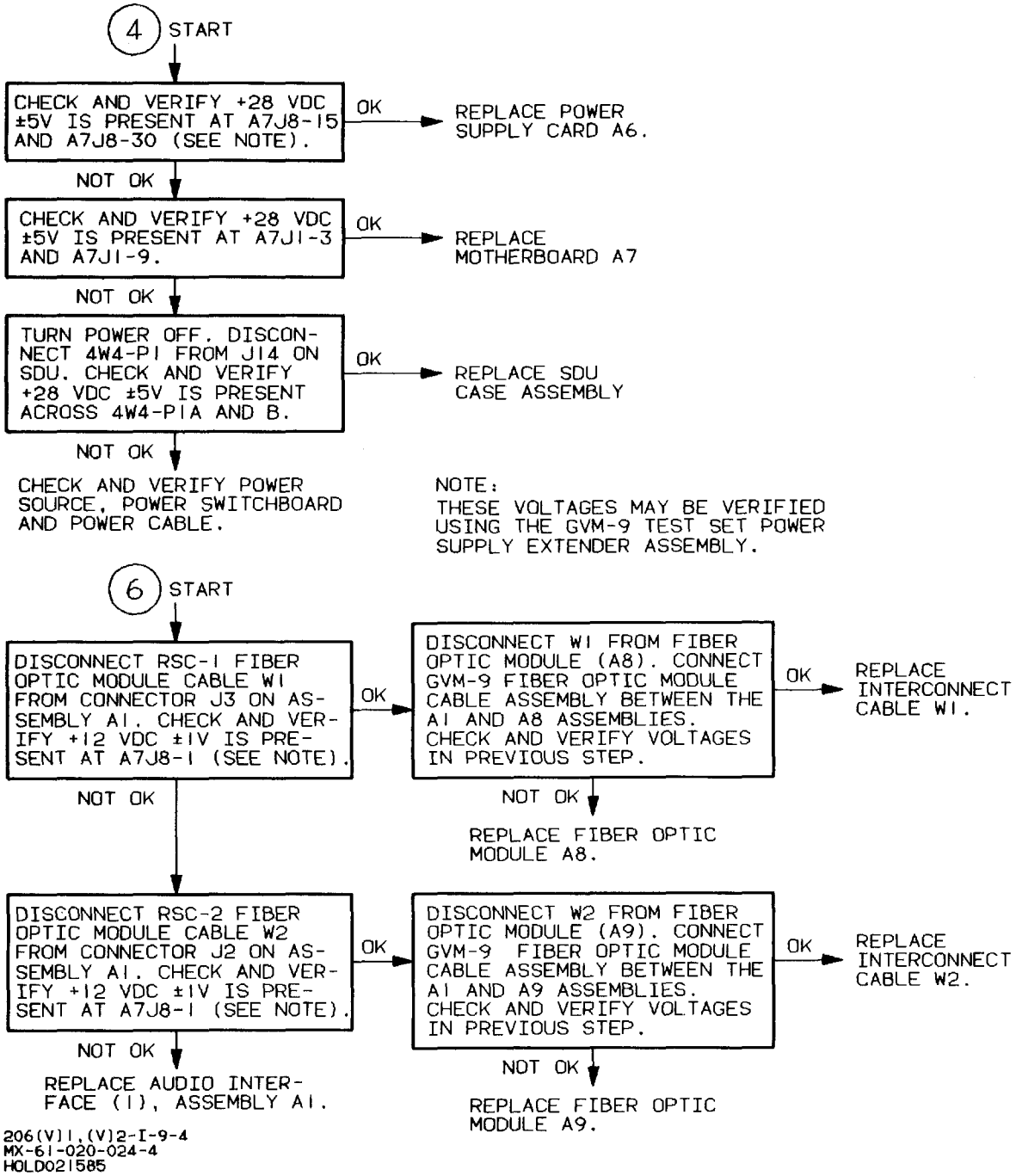


Figure 5-4. SDU Trouble Analysis Diagram (Sheet 4 of 9)

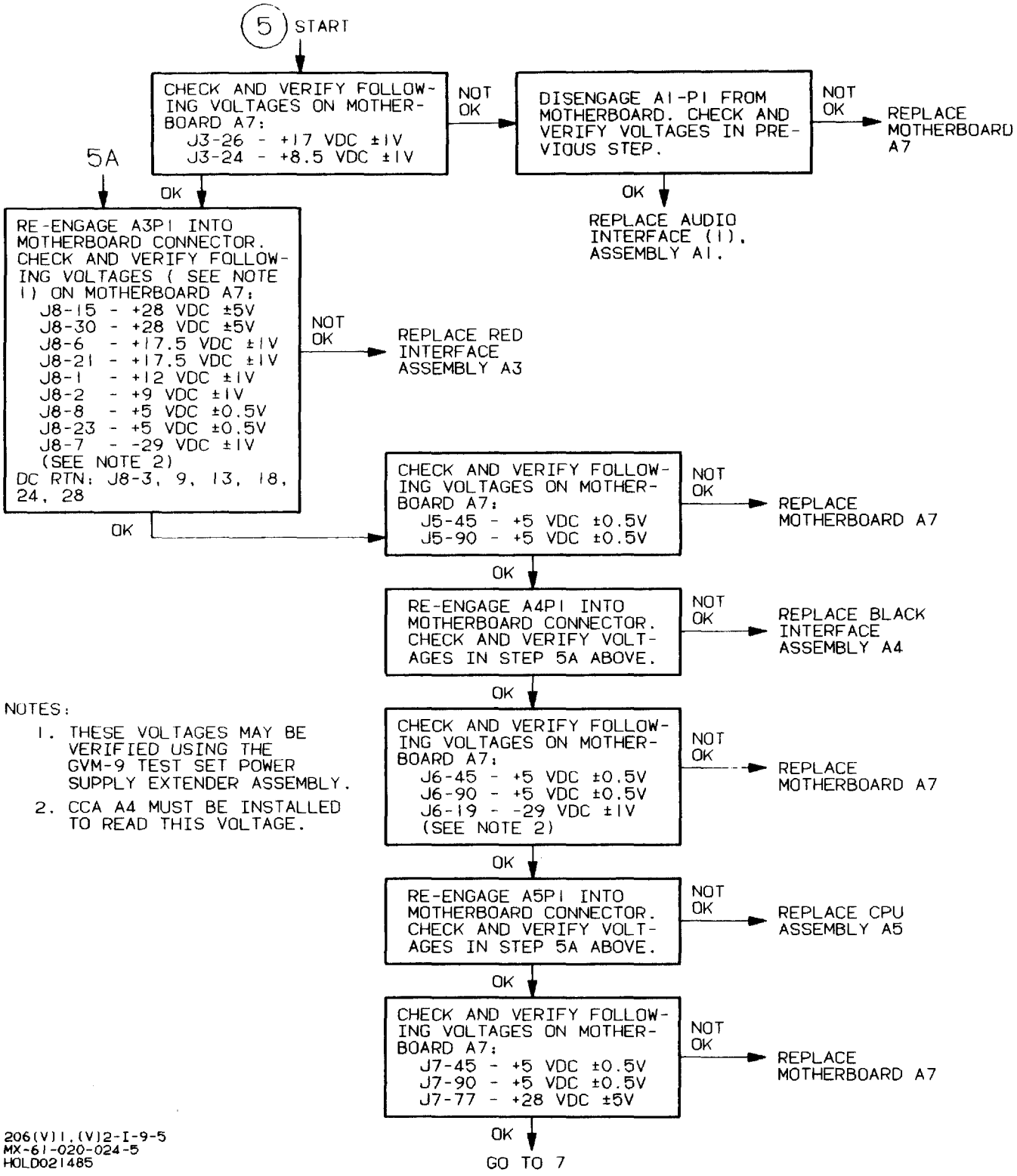
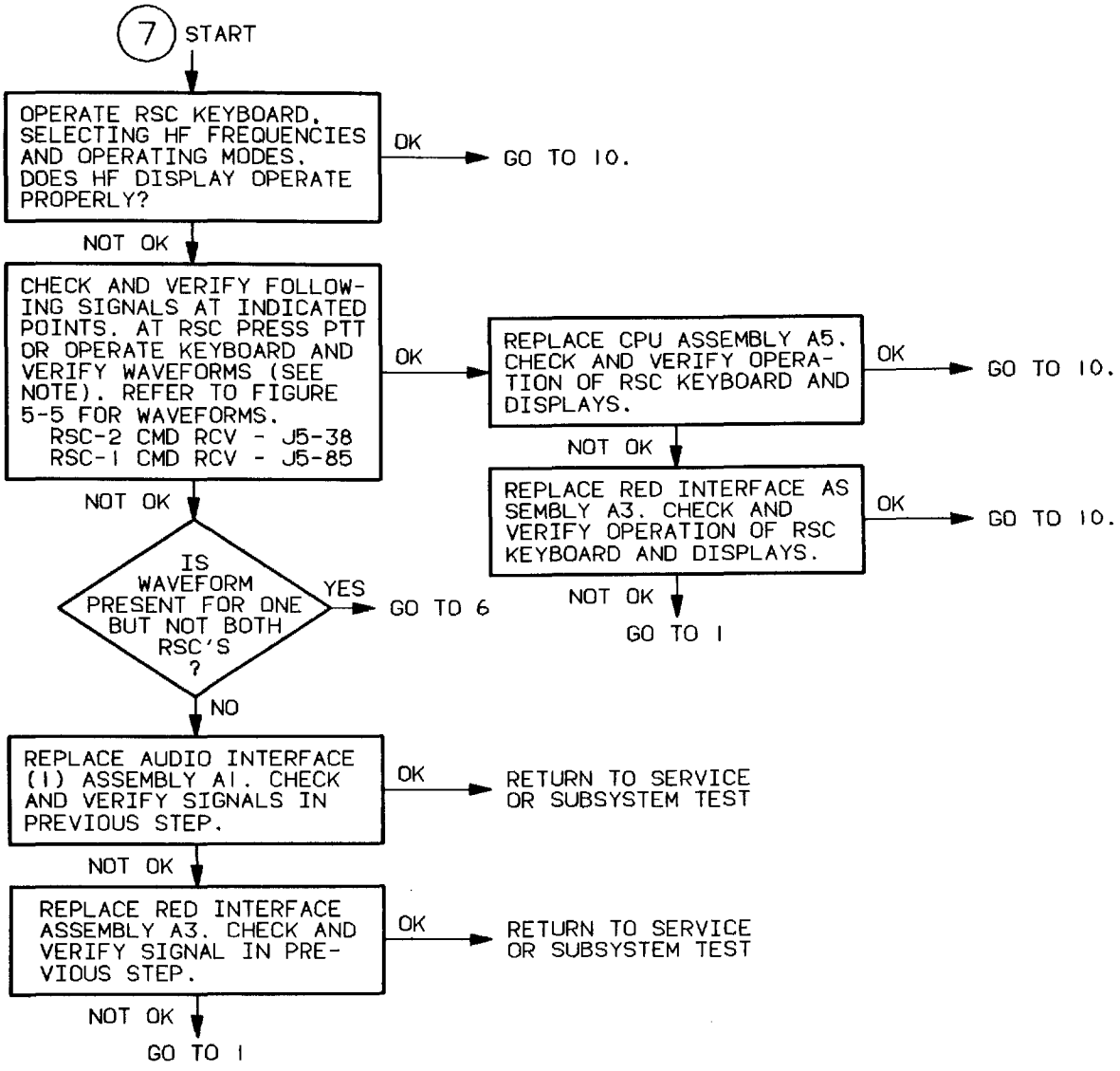


Figure 5-4. SDU Trouble Analysis Diagram (Sheet 5 of 9)



NOTE: WAVEFORMS ARE BRIEF.

206(V)1,(V)2-I-9-6
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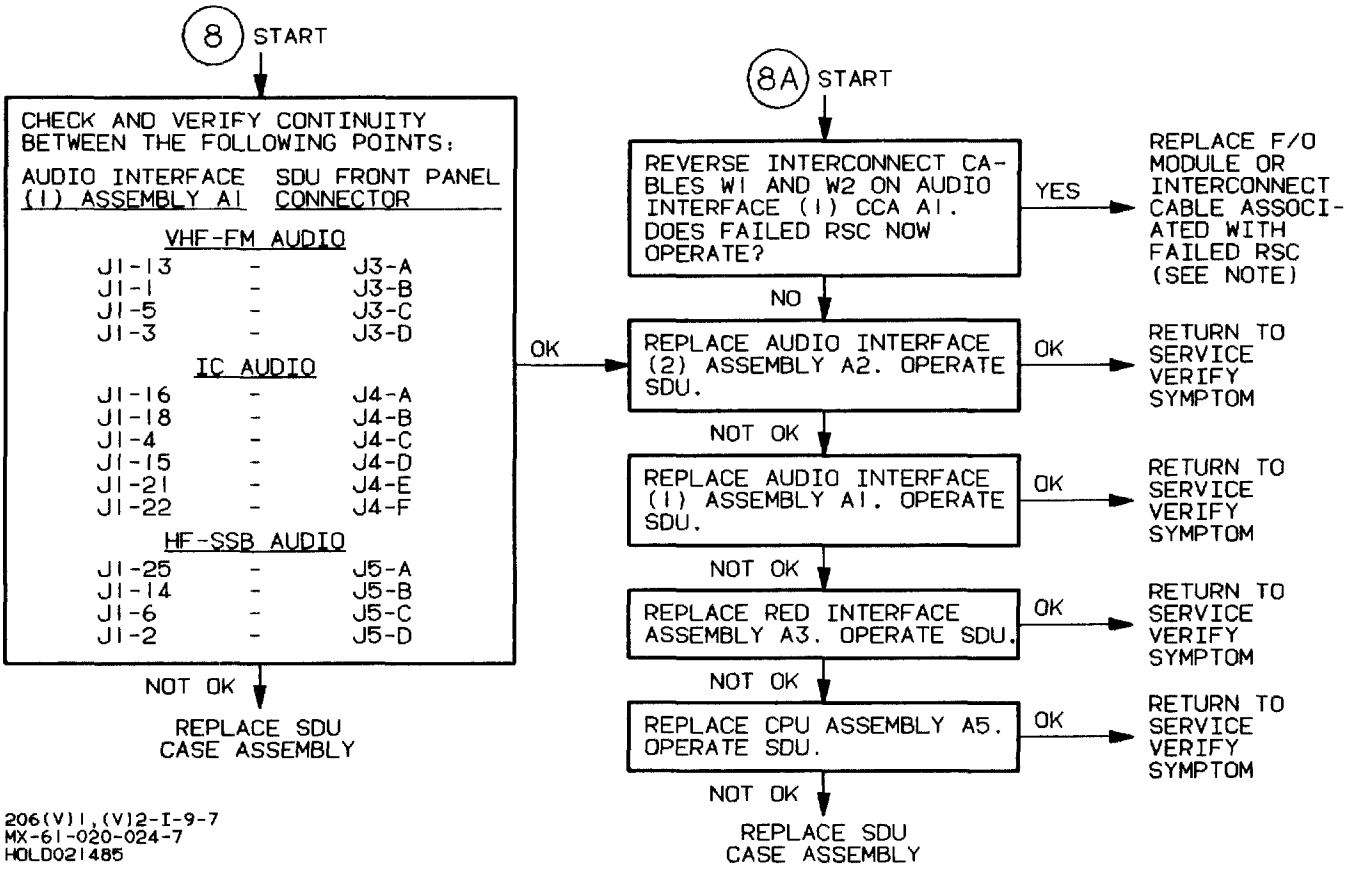
Figure 5-4. SDU Trouble Analysis Diagram (Sheet 6 of 9)

SYMPTOM:

SDU AUDIO TROUBLE;
- INTERCOM AUDIO (IC)
- HF-SSB AUDIO
- VHF-FM AUDIO

NOTE

THE GVM-9 FIBER OPTIC MODULE CABLE ASSEMBLY MAY BE SUBSTITUTED FOR INTERCONNECT CABLE W1 OR W2. THIS SUBSTITUTION SHOULD BE PERFORMED TO ISOLATE THE MALFUNCTION TO A SUSPECT FIBER OPTIC MODULE OR THE ASSOCIATED INTERCONNECT CABLE.



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MX-61-020-024-7
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Figure 5-4. SDU Trouble Analysis Diagram (Sheet 7 of 9)

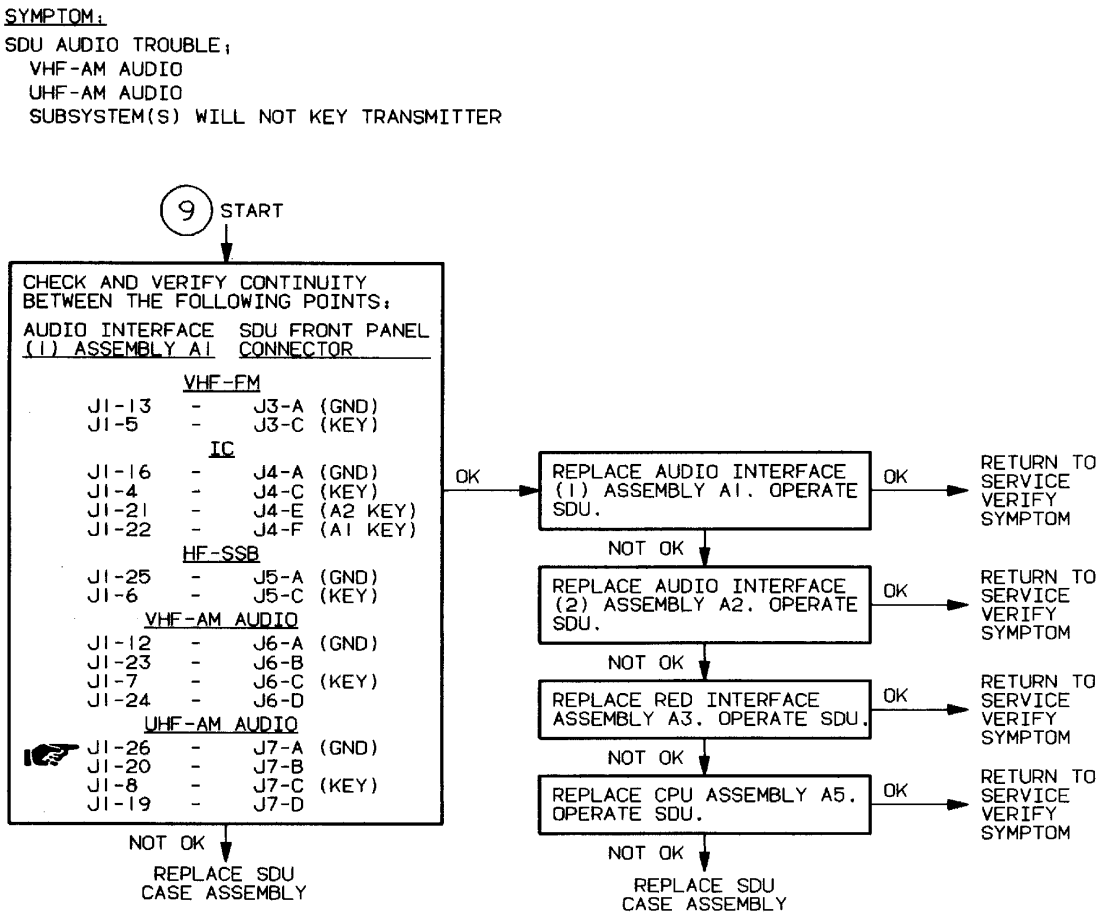


Figure 5-4. SDU Trouble Analysis Diagram (Sheet 8 of 9)

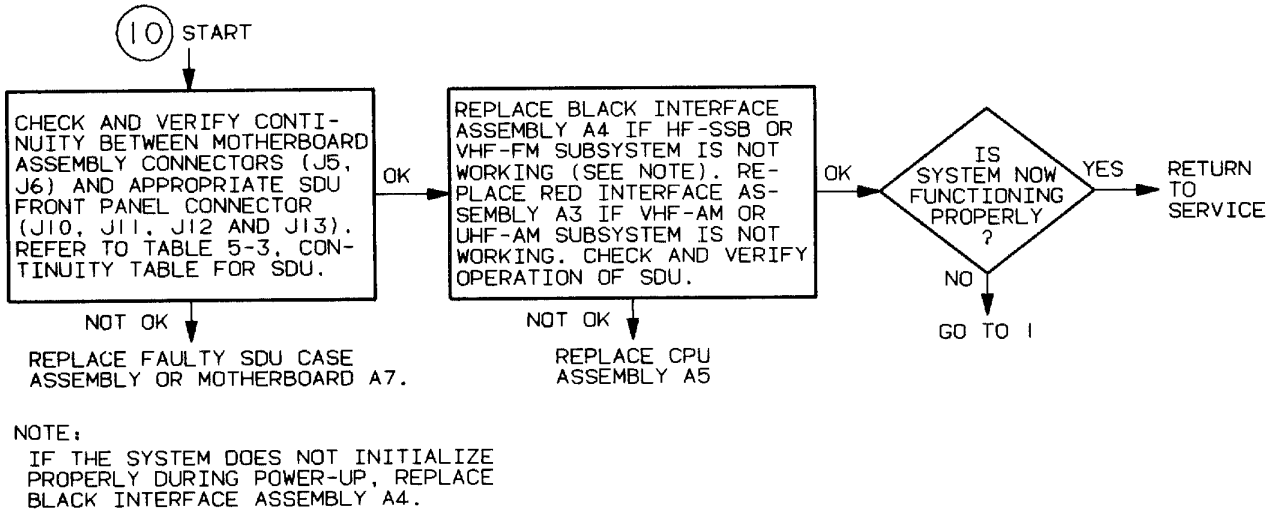


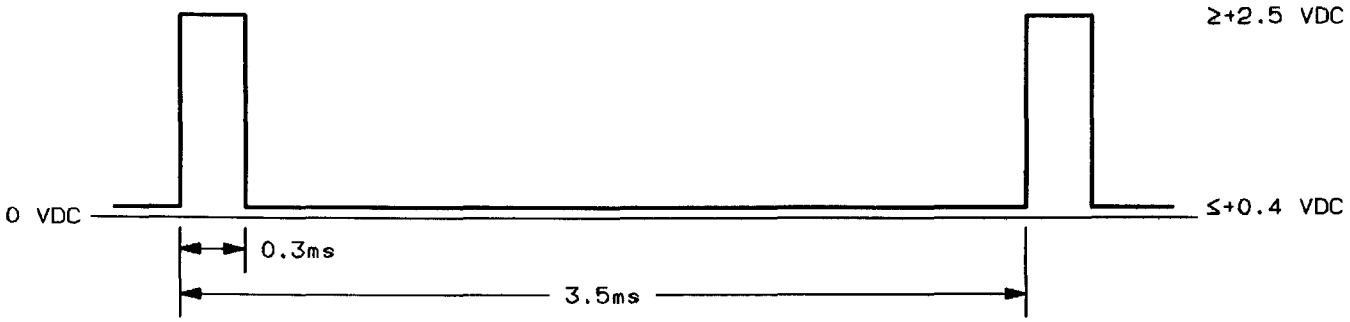
Figure 5-4. SDU Trouble Analysis Diagram (Sheet 9 of 9)

Table 5-3. SDU Trouble Analysis Continuity Table

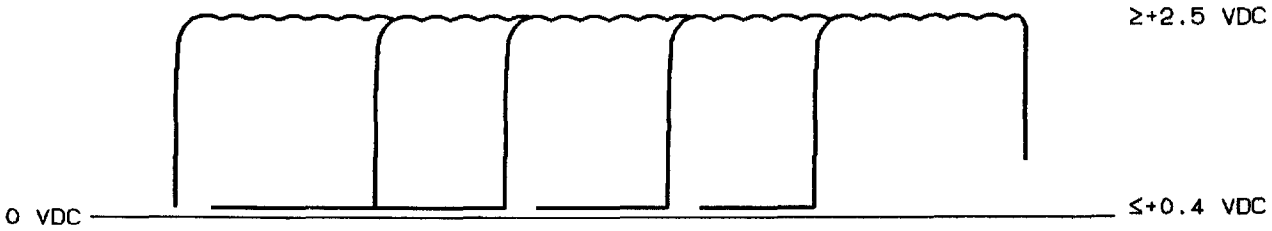
Signal description	Motherboard Assembly A7		SDU Case Assembly	
	From	To	From	To
HF-SSB Radio				
RT-1444 clock	J6-16	J2-37	P2-37	J10-L
RT-1444 clock#	J6-60	J2-28	P2-28	J10-M
RT-1444 control	J6-15	J2-34	P2-34	J10-E
RT-1444 control#	J6-59	J2-31	P2-31	J10-F
RT-1444 status	J6-2	J2-47	P2-47	J10-K
RT-1444 status#	J6-4	J2-49	P2-49	J10-J
Power amp BITE	J6-26	J2-19	P2-19	J10-U
TIP	J6-72	J2-25	P2-25	J10-T
VHF-FM Radio				
+12 Vdc	J8-1	J1-13	P1-13	J11-X
KY/KY#	J6-25	J1-49	P1-49	J11-Z
VHF-BITE	J6-71	J1-47	P1-47	J11-Y
R/T-246 detect	J6-3	J1-24	P1-24	J11-R
Channel 1	J6-84	J1-23	P1-23	J11-N
Channel 2	J6-39	J1-31	P1-31	J11-M
Channel 3	J6-81	J1-17	P1-17	J11-L
Channel 4	J6-36	J1-19	P1-19	J11-K
Channel 5	J6-82	J1-20	P1-20	J11-J
Channel 6	J6-85	J1-26	P1-26	J11-H
Channel 7	J6-83	J1-29	P1-29	J11-G
Channel 8	J6-38	J1-28	P1-28	J11-F
Channel 9	J6-37	J1-22	P1-22	J11-E
Channel 10	J6-40	J1-25	P1-25	J11-D
VHF-FM detect rtn	J6-7	J2-24	P2-24	J11-B
VHF-AM Radio				
Data avail	J5-67	J1-41	P1-41	J12-D
Serial data	J5-6	J1-40	P1-40	J12-K
Data load	J5-52	J1-14	P1-14	J12-M
BITE fault	J5-42	J1-43	P1-43	J12-N
Squelch ind	J5-86	J1-34	P1-34	J12-S
Clear/secure ind	J5-87	J1-37	P1-37	J12-R
PTT ind	J5-41	J1-46	P1-46	J12-T
PTT	J5-23	J1-44	P1-44	J12-U
Data clock	J5-51	J1-16	P1-16	J12-L
2^3	J5-21	J2-13	P2-13	J12-E
2^2	J5-27	J2-4	P2-4	J12-F
2^1	J5-71	J2-11	P2-11	J12-G
2^0	J5-24	J2-7	P2-7	J12-H

Table 5-3. SDU Trouble Analysis Continuity Table-Continued

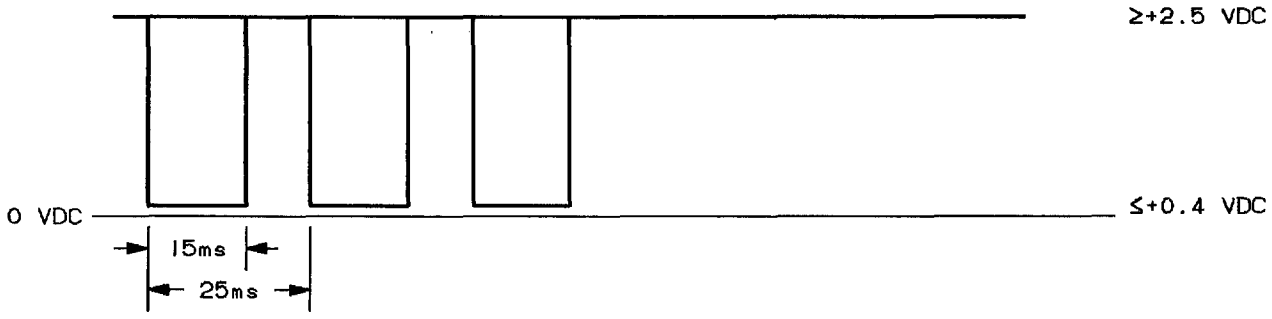
Signal description	Motherboard Assembly A7		SDU Case Assembly	
	From	To	From	To
UHF-AM Radio				
Data avail	J5-66	J2-14	P2-14	J13-D
Serial data	J5-50	J2-23	P2-23	J13-K
Data load	J5-49	J2-26	P2-26	J13-M
BITE fault	J5-44	J2-17	P2-17	J13-N
Squelch ind	J5-89	J2-8	P2-8	J13-S
Clear/secure ind	J5-43	J2-20	P2-20	J13-R
PTT ind	J5-88	J2-5	P2-5	J13-T
PTT	J5-22	J2-10	P2-10	J13-U
Data clock	J5-5	J2-16	P2-16	J13-L
2^3	J5-69	J1-38	P1-38	J13-E
2^2	J5-25	J1-10	P1-10	J13-F
2^1	J5-70	J1-35	P1-35	J13-G
2^0	J5-26	J1-32	P1-32	J13-H



A. J5-37, INTERRUPT 7/J5-84, INTERRUPT 6 TYPICAL WAVEFORM



B. J5-58, RSC2 CMD XMT/J5-56, RSC1 CMD XMT TYPICAL WAVEFORM



C. J5-38, RSC2 CMD RCV/J5-85, RSC1 CMD RCV TYPICAL WAVEFORM

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Figure 5-5. SDU Trouble Analysis Waveform Diagram

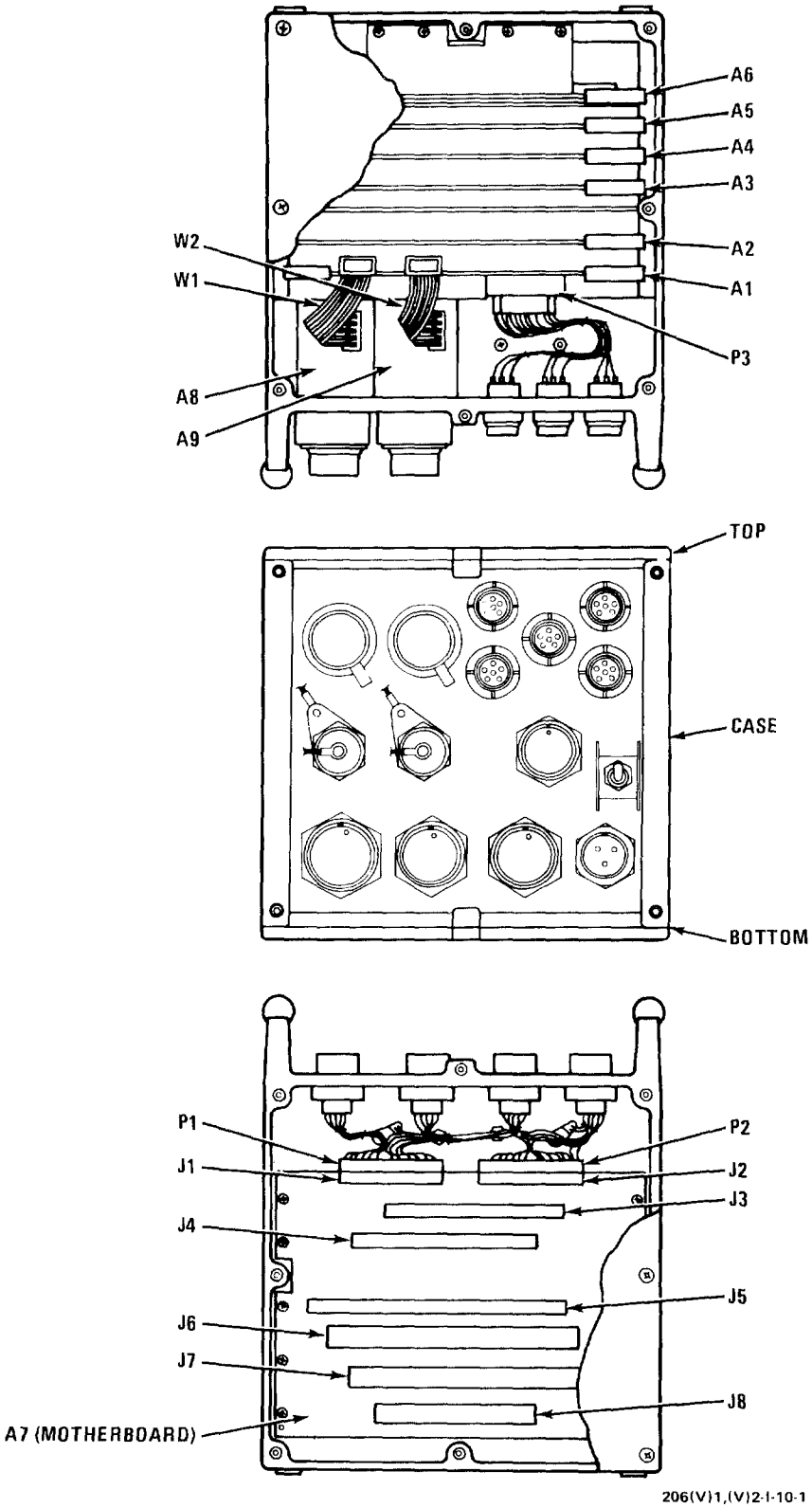


Figure 5-6. SDU Assembly Location Diagram (Sheet 1 of 2)

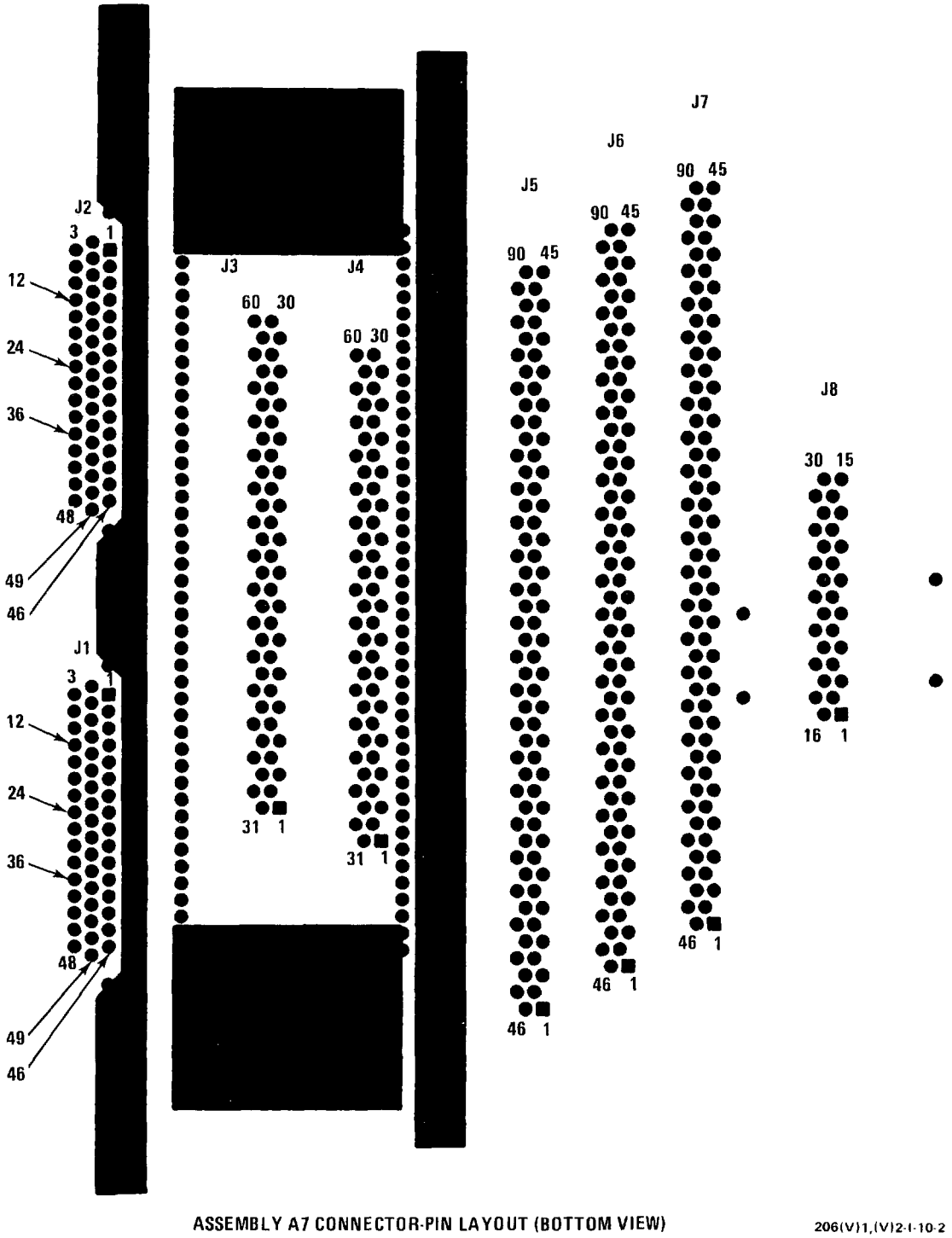


Figure 5-6. SDU Assembly Location Diagram (Sheet 2 of 2)

5-8. POWER SWITCHBOARD MAINTENANCE. Maintenance of the power switchboard is accomplished in accordance with the following paragraphs. The support equipment required to perform the power switchboard maintenance procedures is listed in table 5-1. Refer to figure FO-11 for the power switchboard schematic diagram.

a. Removal. Remove the power switchboard from the equipment mounting rack in accordance with the following procedures. See figure 2-3 for component location.

(1) Set power switchboard PWR RESET/OFF circuit breaker to OFF position.

(2) Turn off primary input power to power switchboard.

(3) Disconnect all cables connected to power switchboard.

(4) Loosen two thumbscrews on SDU-power switchboard mount sufficiently to allow removal of power switchboard.

(5) Pull power switchboard from mount.

b. Operational Checkout. Operational checkout test for the power switchboard is performed in accordance with the performance test checks in section III. The operational checkout is performed with the power switchboard under test interfaced with Radio AN/GRM-116 Test Set (GRM-116 test set) to determine serviceability. If the required indications are not obtained, replace the power switchboard.

(1) Preliminary Test Setup. Place the power switchboard on a clean work surface close to the GRM-116 test set and perform the following steps:

(a) Place PWR switches on GRM-116 test set equipment and power switchboard under test to OFF position.

(b) Remove known good power switchboard from GRM-116 test set and install power switchboard under test.

(c) Perform power switchboard checkout in accordance with the performance test checks in section III.

c. Troubleshooting. Troubleshooting the power switchboard is limited to determining power switchboard serviceability. This is accomplished by performing the operational checkout procedures and replacing the power switchboard if the required indications are not obtained. Refer to the operational checkout procedures.

d. Testing. Test the power switchboard prior to installing it in the equipment mounting rack by performing the operational checkout procedures.

e. Installation. Install the power switchboard in the equipment mounting rack in accordance with the following procedures. See figure 2-3 for component location.

(1) Position power switchboard in SDU-power switchboard mount and secure with two thumbscrews.

(2) Connect power cable W1 to connector J4 (if vehicle power will be used), or connect W2 to connector J5 (if auxiliary motor generator power will be used).

5-9. HF RADIO SET MAINTENANCE. Maintenance of the HF radio set is accomplished in accordance with the following paragraphs. The support equipment required to perform the HF radio set maintenance procedures is listed in table 5-1. In addition to the support equipment listed in table 5-1, a ground plane (aluminum sheet)

and screwdriver type torque wrench is required to perform maintenance on the HF radio set. Refer to the list of required equipment in table 1-6.

a. Removal. Remove the HF radio set from the equipment mounting rack in accordance with the following procedures. See figure 2-3 for component location.

(1) Turn off power to Radio System.

(2) Disconnect all cables (except 3W1) connected to HF radio set front panel, and 4W9P2 from side connector of RT-1444.

(3) Disconnect power cable 4W1 from rear panel of HF radio set.

(4) Remove ground strap and antenna feed wire from rear panel of HF radio set.

(5) Loosen two thumbscrews on HF radio set mount sufficiently to allow removal of HF radio set.

(6) Pull HF radio set from mounting tray.

b. Operational Checkout. Operational checkout test for the HF radio set is performed in accordance with the operational test checks in table 5-4. The operational checkout is performed with the HF radio set under test interfaced with Radio AN/GRM-116 Test Set (GRM-116 test set) to determine operational capability. If the required indications are not obtained, perform HF radio set troubleshooting. To power the HF radio set, refer to paragraph 6-2 and construct a power cable as shown in figure 6-1.

(1) Preliminary Test Setup. Place the HF radio set on a ground plane (aluminum sheet, 3.3 ft x 3.3 ft x 0.06 in) close to GRM-116 test set and perform the following steps:

(a) Set the HF radio set and antenna simulator (172H-21A) on the ground plane.

(b) Using a copper strap, connect the AM-7148 ANTENNA terminal to the rf terminal on the antenna simulator. Ensure that there is no connection to the 50 OHM BNC connector on the AM-7148 and the 50 OHM/ANTENNA TERM switch is in the ANTENNA TERM position.

WARNING

When power is applied, high voltage will be present at the rf connection between the AM-7148 and antenna simulator. Do not touch this connection when power is applied, death or injury could occur.

(c) Place power switches on GRM-116 test set equipment and HF radio set under test to OFF position.

(d) Connect the locally manufactured power cable between the AM-7148 and power junction unit (PJU); connect P1 to AM-7148 connector J6, and P2 to power distribution cable 4W1 P1. If the power cable was constructed without connector P2, connect conductors to a power source capable of supplying +22.5 to 30 Vdc.

(e) Adjust the input power source to the GRM-116 test set for +25 Vdc and set the ON/OFF switch on the antenna simulator to ON.

(f) Perform HF radio set checkout in accordance with the operational checkout procedures in table 5-4.

Table 5-4. HF Radio Set Operational Checkout

Step	Connection of test equipment	Point of test	Control settings and operation of equipment	Performance standard
1.		GRM-116 test set	On power switchboard, set power select switch to AUX M/G and PWR RESET/OFF switch to RESET. Verify voltage on input power meter.	POWER lamp lights, meter reads between +22.5 to +30.0 Vdc.
2.		HF radio set	Set RT-1444 SQL/VOL control to midrange and set AM-7148 MONITOR/TEST switch to SYSTEM STATUS. Set AM-7148 POWER RESET/OFF switch to RESET and observe MONITOR/TEST display on AM-7148.	Two second display of: 8, then 0, then blank (refer to table 5-5 if any other symbol is displayed).
3.		AM-7148	Set MONITOR/TEST switch to MODULE TEST position and observe MONITOR/TEST display on AM-7148.	Five second display of: 0, then blank (refer to table 5-6 for any other display indication).
4.		HF radio set	Adjust the AM-7148 OFF/VOLUME control to midrange position. Adjust the RT-1444 SQL/VOL control fully clockwise. Set MONITOR/TEST switch to SYSTEM STATUS.	
5.		RT-1444	Set the RT-1444 FREQUENCY KHz selector switches for a frequency below 2.0000 MHz. **NOTE** An intermittent audio tone is heard in speaker for approximately five seconds, also a letter F will be visible on the MONITOR/TEST display.	Audible tone is heard from AM-7148 speaker and the letter F will be visible on the MONITOR/TEST display.
6.		AM-7148	Set AM-7148 POWER RESET/OFF switch to OFF, and VOLUME/OFF control to OFF. On RT-1444 set SQL/VOL fully counter-clockwise (OFF).	

Table 5-4. HF Radio Set Operational Checkout-Continued

Step	Connection of test equipment	Point of test	Control settings and operation of equipment	Performance standard
7.		GRM-116 test set	Set power switchboard PWR RESET/OFF switch to OFF position.	
8.			Remove power and normalize equipment.	

c. Troubleshooting. Troubleshooting the HF radio set consists of performing the HF radio set operational checkout procedures. If the correct indications are not obtained, refer to table 5-5 or 5-6 and replace the assembly associated with the fault indication. To troubleshoot the AM-7148 audio amplifier (A5A3) perform the procedures in figure 5-8. To troubleshoot malfunctions associated with RT-1444, refer to TO 31R2-2PRC104-2-1. Use the disassembly and reassembly procedures to replace the indicated component or assembly.

d. Disassembly. Disassembly of the HF radio set is accomplished in accordance with the following procedures. Prior to performing the disassembly procedures, refer to paragraph 3-6d for information on assemblies which contain devices that are sensitive to electrostatic discharge (ESD).

(1) Disconnect cable 3W1 from HF radio set components.

(2) Remove RT-1444 by disengaging two turn-lock fasteners. Gently pull RT-1444 outward from left-hand side until mating connector at right is disengaged. With RT-1444 centered over left-hand handle on AM-7148, lift and pull RT-1444 clear of AM-7148 and set unit on work surface.

(3) Disassembly of RT-1444. Refer to figure 2-2, and perform the following steps.

CAUTION

Do not position the receiver-exciter so that the control panel will fall out when it is removed. Damage to the flex cable could result.

(a) Position receiver-exciter on a flat surface so that the control panel assembly is facing up.

(b) Loosen six socket head captive screws on the control panel.

CAUTION

When the control panel is removed, care should be taken to prevent static discharge.

(c) Lift control panel from housing extension kit.

(d) Alternately loosen two socket head screws and disconnect flex cable from housing extension kit top connector; remove control panel.

(e) Lift housing extension kit from receiver-exciter housing.

(f) Alternately loosen two socket head screws and disconnect flex cable from housing extension kit bottom connector; remove housing extension kit.

(4) Disassembly of Amplifier-Coupler AM-7148. Refer to figure 5-9 and perform the following steps:

(a) Loosen twelve (12) captive screws located along top edge of AM-7148.

CAUTION

Use care in separating the AM-7148 to avoid damage to O-ring seal and grooves.

(b) Carefully separate chassis A5 (top) and chassis A1 (bottom) sections to disengage mating connector inside unit. Turn chassis A5 over and set aside.

(5) Removal of Control Logic Assembly A4. Refer to figure 5-9 and perform the following steps.

CAUTION

During removal of the A1A4 assembly, ensure that the cable that mates with A4J1 is clear of coaxial connector A1P3 on low pass filter assembly A1A3; also avoid placing excessive strain on the cables and mating connectors.

NOTE

Control logic assembly A4, consists of subassemblies A4A1 and A4A2.

(a) Locate and remove three crosshead screws that secure control logic assembly A4 to antenna tuner A2, low pass filter A3 and chassis A1 mounting bracket. Two of the three screws are installed through spacers.

(b) Lift assembly A4 clear of the grooves in chassis A1 just far enough to gain access to the four cable connectors.

CAUTION

When disconnecting the connectors, pull straight outward or damage to the connector pins could result.

(c) Disconnect cable connectors A3P1, A2A1P1, and A2P1 from their respective jacks on assembly A4.

(d) Carefully disconnect A1P1 from A4J1 (lower left-hand corner of assembly A4). Remove assembly A4 from chassis A1.

(6) Removal of Low Pass Filter Assembly A3. Refer to figure 5-9 and perform the following steps.

(a) Remove control logic assembly A4; refer to paragraph (5).

(b) Using a 1/4 inch open end wrench, disconnect coaxial cable connectors A1P3, A3P2, and A3P3 from their respective jacks.

(c) Loosen four crosshead screws that secure the bottom flanges of assembly A3 to chassis A1, and remove assembly A3.

(7) Removal of Antenna Tuner Assembly A2. Refer to figure 5-9 and perform the following steps.

(a) Remove control logic assembly A4; refer to paragraph (5).

NOTE

Antenna tuner A2, consists of subassembly A2A1 and the coil mounting bracket attached to the left-hand side of assembly A2.

(b) Disconnect coaxial cable connectors A3P3 and A1P4 from assembly A2.

(c) Loosen five crosshead screws that secure assembly A2 to chassis A1.

(d) Lift A2 assembly approximately one inch and slide the assembly towards the front of AM-7148 to clear chassis wiring harness.

(8) Removal of Power Amplifier Assembly A1A1. Refer to figure 5-9 and perform the following steps.

(a) Disconnect coaxial cable connector A3P2 from assembly A1A1.

(b) Loosen two inner captive screws on terminal board TB1 (PN 659-1192-001).

(c) Remove five crosshead screws (one at each corner and one in center) and attaching hardware from assembly A1A1.

NOTE

Before removing the following terminal lugs, ensure that each lug is marked; if not, mark each lug according to the terminal it was removed from.

(d) Remove three crosshead screws and terminal lugs from A1A1-E1, -E3, and -E2.

(e) Remove twelve (12) socket-head screws that secure the six power transistors directly to chassis A1 heatsink.

(f) Carefully pry up assembly A1A1 to separate from the thermal grease applied between components of assembly A1A1 and chassis A1 heatsink.

(g) Disconnect cable connector A1P2 from assembly A1A1, and remove the A1A1 assembly from chassis A1.

e. Reassembly. Reassembly of RT-1444 is accomplished in accordance with the RT-1209 modification procedures; refer to Chapter 2, paragraph 2-10, steps (e) through (i). Reassembly of the HF radio set is accomplished in accordance with the following procedures. See figure 5-9 for location of assemblies, and refer to paragraph 3-6d for information on assemblies which contain devices that are sensitive to electrostatic discharge (ESD).

(1) Replacement of Power Amplifier A1A1. Refer to figure 5-9 and perform the following steps.

CAUTION

Extreme care must be taken to avoid mixing any impurities into thermal grease that would prevent thermal contact with heatsink.

NOTE

Prior to mounting assembly A1A1, ensure that a thin coat of thermal grease (PN 005-1234-020) is applied to the six power transistors that mount directly to chassis A1 heatsink, and to the heatsink itself.

(a) Apply a thin coat of thermal grease (PN 005-1234-020) to the six power transistors that mount directly to chassis A1 heatsink, and to the heatsink itself.

(b) Carefully position assembly A1A1 onto chassis A1 heatsink.

(c) Connect cable connector A1P2 to assembly A1A1.

(d) Install and tighten twelve (12) socket-head screws that secure the six power transistors directly to chassis A1 heatsink. Torque each socket-head screw to between 6 to 7 inch-pound.

NOTE

During reassembly of assembly A1A1, ensure that the socket-head screws that secure the six power transistors directly to chassis A1 heatsink are torqued to between six (6) to seven (7) inch-pound using screwdriver type torque wrench.

(e) Install and tighten three screws and terminal lugs to A1A1-E1, -E3, and -E2. Note markings attached during removal.

NOTE

Before tighting the terminal lugs, ensure that each lug is installed in the terminal it was removed from.

(f) Install five crosshead screws (one at each corner and one in center) in assembly A1A1.

(g) Tighten two captive screws on terminal board TB1 (PN 659-1192-001).

(h) Connect coaxial cable connector A3P2 to assembly A1A1.

(2) Replacement of Antenna Tuner Assembly A2. Refer to figure 5-9 and perform the following steps.

CAUTION

RF output, (A2 Tuner Assy P/N 642-1859-1859-001) mechanical contacts shall be bent together when installing A2 Tuner Assy for positive contact. Refer to figure 5-9 Antenna terminal (A1E3) for location.

(a) Carefully install assembly A2 in chassis A1.

(b) Alternately tighten five crosshead screws that secure assembly A2 to chassis A1.

(c) Connect coaxial cable connectors A3P3 and A1P4 to assembly A2.

(e) Connect cable connectors A2P1 and A2A1P1 to A4J4 and A4J3 respectively, on assembly A4.

(f) Install control logic assembly A4; refer to paragraph (4).

(3) Replacement of Low Pass Filter Assembly A3. Refer to figure 5-9 and perform the following steps.

(a) Install assembly A3 and alternately tighten four captive screws that secure the bottom flanges of assembly A3 to chassis A1.

(b) Using a 1/4 inch open end wrench, carefully connect coaxial cable connectors A1P3, A3P2, and A3P3 to their respective jacks.

(c) Install control logic assembly A4; refer to paragraph (4).

(4) Replacement of Control Logic Assembly A4. Refer to figure 5-9 and perform the following steps.

CAUTION

During replacement of the A4 assembly, ensure that the cable that mates with A4J1 is clear of coaxial connector A1P3 on low pass filter assembly A3; also avoid placing excessive strain on the cables, and mating connectors.

CAUTION

When connecting the connectors, push straight inward or damage to the connector pins could result.

(a) Position assembly A4 clear of grooves in heat sink and tilt assembly A4 outward just far enough to gain access to mating connectors at rear of assembly. Carefully connect A1P1 to A4J1.

(b) Position assembly A4 in grooves in heat sink and connect cable connectors A3P1, A2A1P1, and A2P1 to their respective jacks on assembly A4.

(c) Install and alternately tighten three crosshead screws that secure control logic assembly A4 to the lower electrical equipment chassis A1. Two of the three screws are installed through spacers.

(5) Assembly of Amplifier-Coupler AM-7148. To assembly the AM-7148 top (A1) and bottom (A5) assemblies, refer to figure 5-9 and perform the following steps.

CAUTION

When assembling upper (A1) and lower (A5) chassis assemblies, be careful to avoid damage to the O-ring seal. Inspect to ensure proper position of O-ring seal before tightening flange mounting screws.

(a) Carefully assemble chassis A5 (top) and chassis A1 (bottom) sections to engage mating connectors inside unit.

(b) Alternately tighten twelve (12) captive screws located along top edge of AM-7148. The flange mounting screws that secure the upper chassis A5 to lower chassis A1 are required to be torqued to between 18 to 22 inch-pounds. Refer to figure 5-9 for the proper torquing sequence.

f. Testing. After troubleshooting, removal/replacement or repair of assemblies/components of the HF radio set, perform the operation checkout test contained in table 5-4 (refer to operational checkout, paragraph b). The operational checkout procedures contained in table 5-4, test the HF radio set as a stand along unit. If the required indications are obtained during testing, possible malfunctions may exist between the HF radio set and Radio System interface. Test the HF radio set prior to installing it in the equipment mounting rack, by performing the performance test checks in section III. Refer to the HF radio set test setup, figure 5-7, and perform the HF radio performance test checks in section III.

g. Installation. Install the HF radio set in the equipment mounting rack in accordance with the following procedures. See figure 2-3 for component location.

(1) Position RT-1444 so that top portion of left handle on AM-7148 is aligned with center V-cut in RT-1444 front panel. Lower and slide RT-1444 right until a firm connection is made with mating connector on AM-7148.

(2) Position and tighten front and left side latches to secure RT-1444 in place.

(3) Connect cable 3W1(P1) to bottom AUDIO connector of RT-1444 and connector 3W1(P2) to AUDIO connector on AM-7148.

(4) Insert HF radio set into mounting tray and secure with two thumbscrew fasteners.

(5) On rear panel, connect antenna cable (feed wire) to ANTENNA connector. Position rubber boot (insulator) over antenna connector.

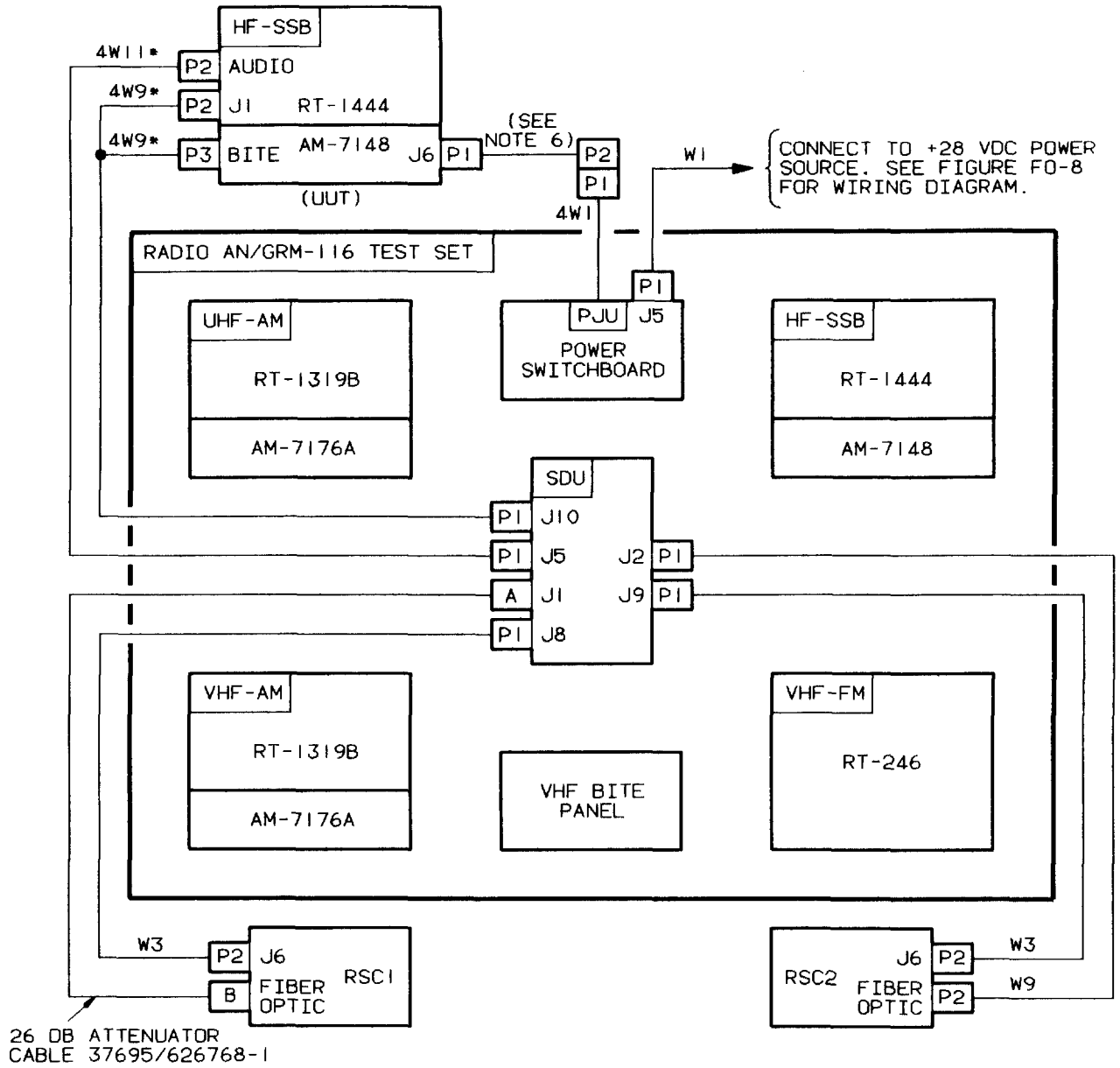
(6) Close pressure equalizer valve on rear panel.

(7) Connect ground strap from equipment mounting rack to GROUND connector and secure with wing nut.

(8) Connect power cable 4W1(P1) to rear panel connector J6.

(9) Connect 4W9P2 to connector J1 on RT-1444, and 4W9P3 to BITE connector on AM-7148.

(10) Refer to cabling diagram, figure FO-7, and make cable connections to meet desired Radio System configuration requirements.



NOTES: 1. CABLES SUFFIXED WITH AN ASTERISK * (e.g.4W13*) ARE PART OF THE ADAPTER CABLE TEST SET.

2. THE 26 DB ATTENUATOR CABLE (37695/626768-1) IS PART OF RECEIVER-TRANSMITTER AN/GVM-9 TEST SET.

3. CONNECT TEST EQUIPMENT AS REQUIRED IN TEST PROCEDURES.

4. REFER TO FIGURE FO-7 FOR CABLE CONNECTIONS BETWEEN GRM-116 TEST SET EQUIPMENTS. CONNECT GRM-116 TEST SET EQUIPMENT FOR NONSECURE VOICE OPERATION, OR SET COMSEC EQUIPMENT TO PLAIN TEXT.

5. PERFORM THE PRELIMINARY TEST SETUP PROCEDURES (STEPS A, B AND C) REQUIRED FOR THE OPERATIONAL CHECKOUT PRIOR TO TESTING THE HF RADIO SET.

6. THE POWER CABLE FOR THE AM-7148/GRC-206 IS A LOCALLY MANUFACTURED CABLE. REFER TO FIGURE 6-1 FOR THE HF EXTENDER CABLE WIRING DIAGRAM.

206(V)1,(V)2-I-13
MX-61-020-025
BLS120984

Figure 5-7. HF Radio Set Test Setup

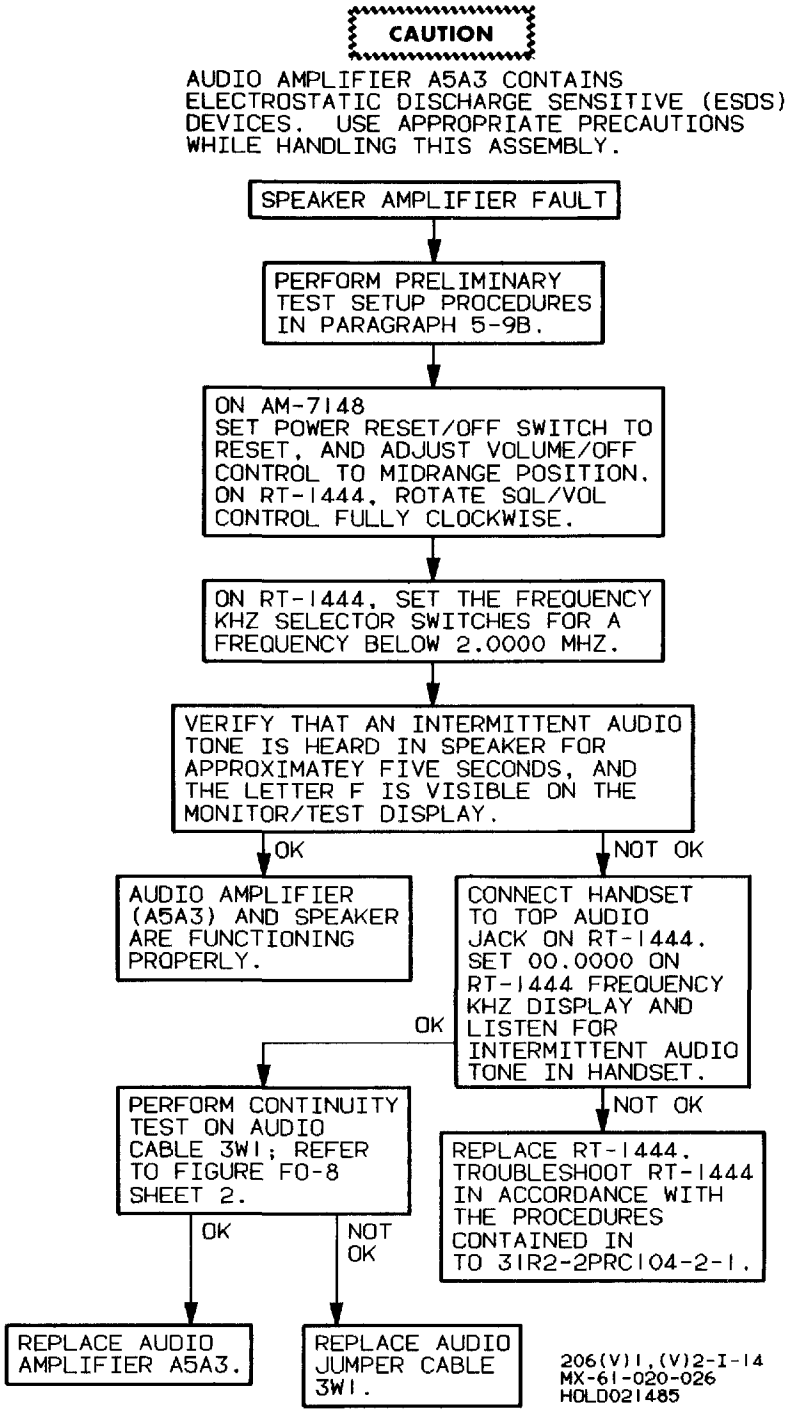


Figure 5-8. HF Radio Trouble Analysis Diagram

Table 5-5. AM-7148 System Status Display Indications

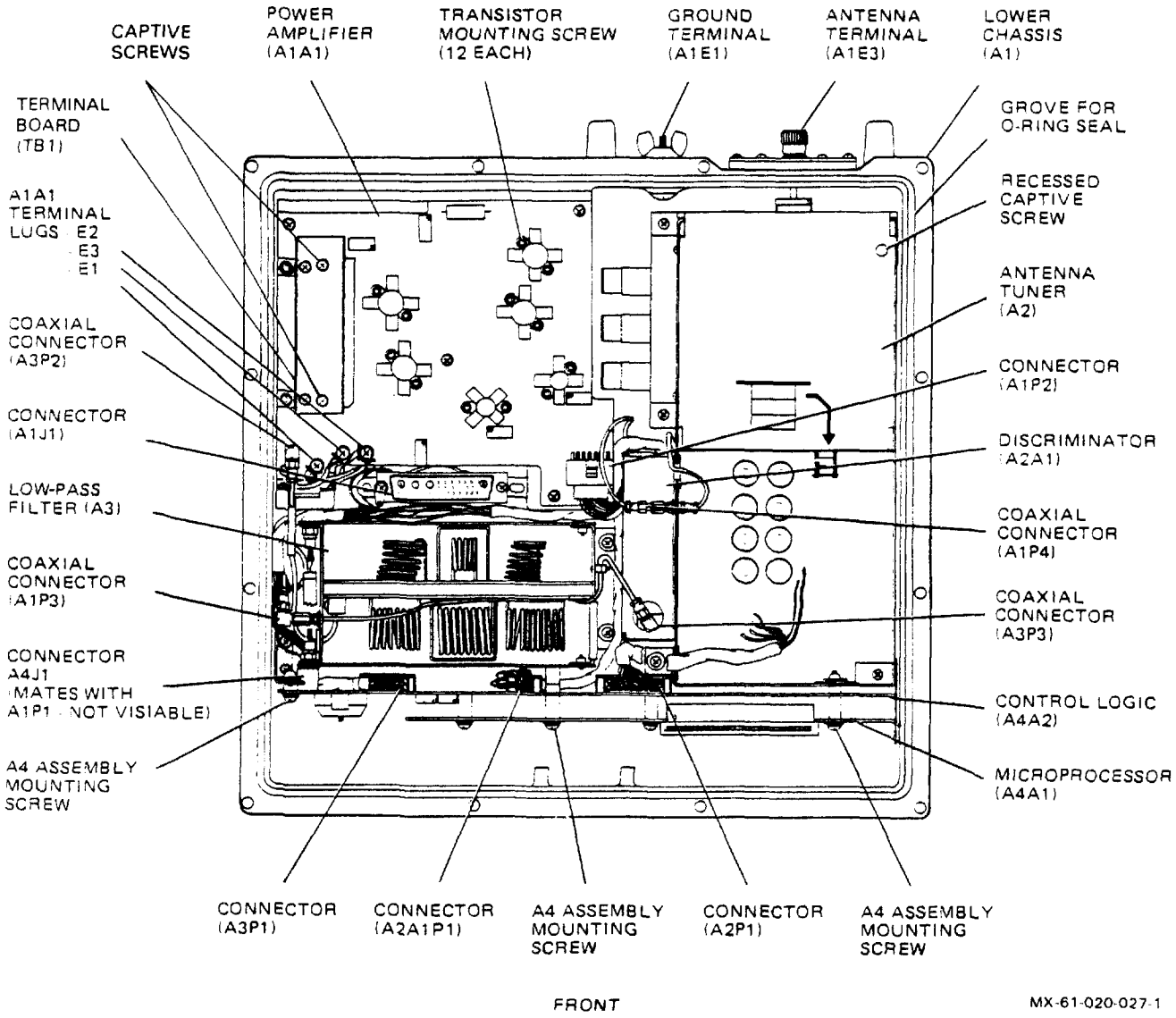
Display readout	Indicated fault	Required maintenance action
Momentary 8, then 0, then blank	No fault. Normal turn-on sequence	None. Two second duration.
F	Invalid frequency	Select frequency between 2.0000 and 29.9999 MHz. Confirm frequency entry.
b	Low primary voltage (<+22 Vdc).	Check and verify operation of prime power source.
E	Exciter RF output below specification	Replace RT-1444/URC.
. (Decimal)	Power conditioner faulty	Replace AM-7148/GRC-206.
-- (Center bar)	Switched +5V supply faulty	Replace AM-7148/GRC-206.
A	AM-7148/GRC-206 or antenna faulty	Run module test. If AM-7148/GRC-206 ok, replace antenna. If not, replace AM-7148/GRC-206.
L	No fault. Normal when PTT is keyed and there is low output power (SSB with no modulation).	Depress PTT key and voice modulate. Observe that an 0 appears in display readout. If not replace AM/7148/GRC-206.
	NOTE Display indications of E or F are associated with RT failures.	

Table 5-6. AM-7148 Module Test Display Indications

Display readout	Indicated fault	To restore normal operation
Five second display of: 0 then blank	Normal initiation of self test	None.
Blank (No momentary zero displayed at initiation of self test)	Microprocessor fault	Remove/replace A4
1	Power amplifier fault	Remove/replace A1A1
2 (see note)	Antenna tuner fault	Remove/replace A2
3	Low pass filter fault	Remove/replace A3
4	Microprocessor/control fault	Remove replace A4
. (Decimal)	Power conditioner fault	Remove/replace A5
-- (Center bar)	Switched +5 Vdc fault	Remove/replace A4

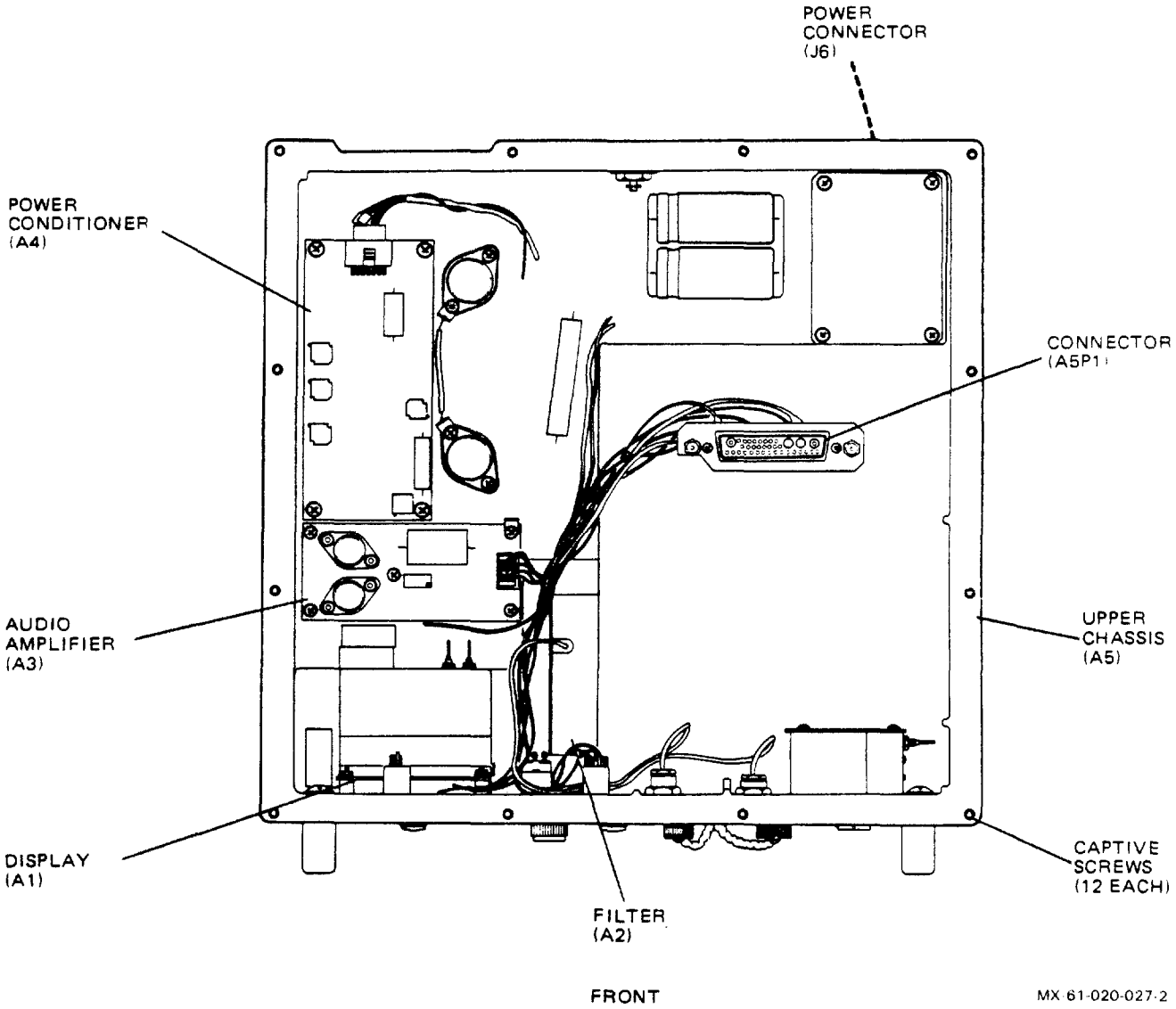
NOTE

When a dummy load is connected to the AM-7148 50 OHM connector and the TEST/MONITOR switch is set to MODULE TEST, a 2 will be present on the BITE display.



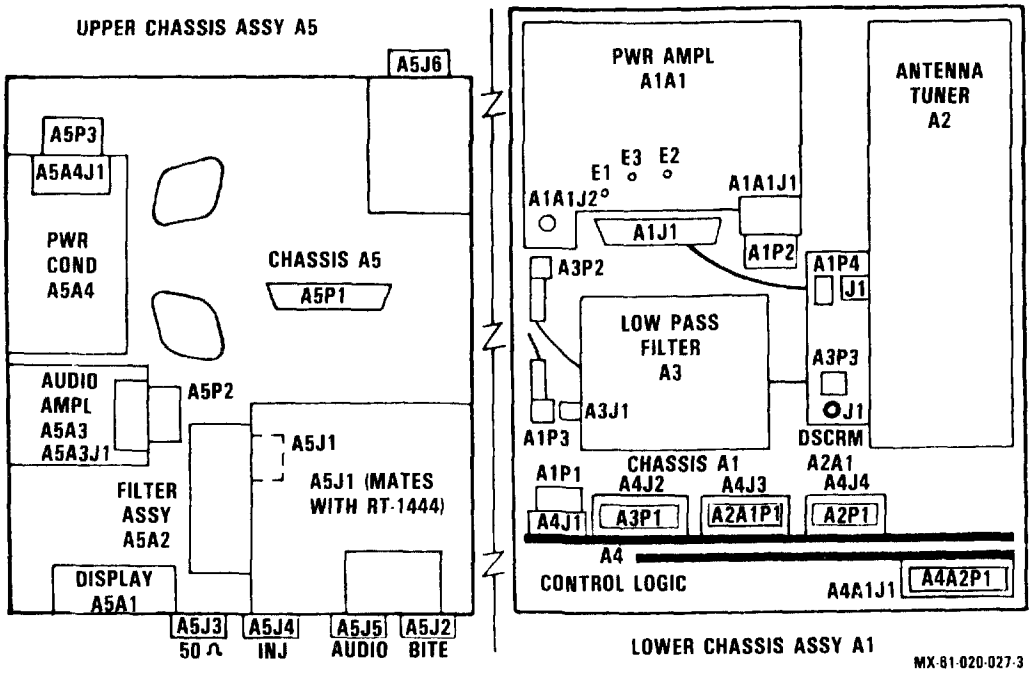
Lower Chassis Assembly A1

Figure 5-9. AM-7148 Assembly Location Diagram (Sheet 1 of 4)



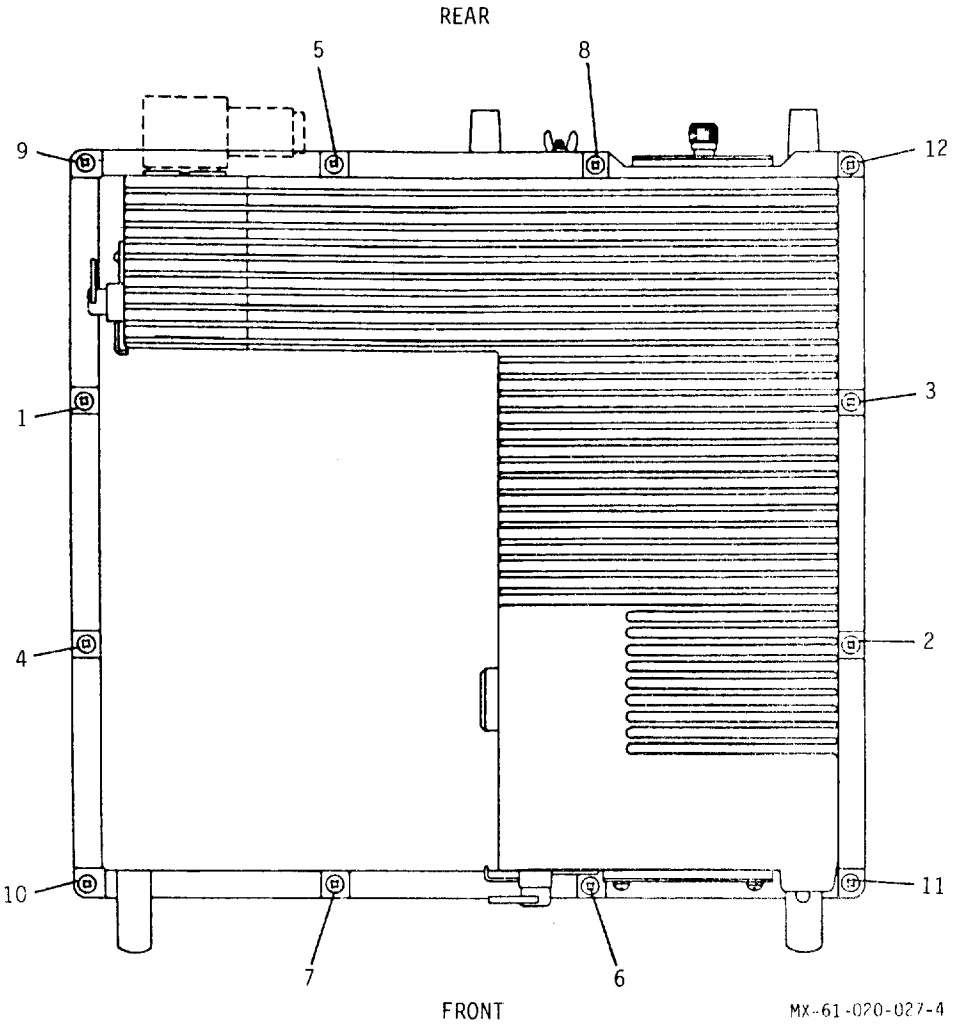
Upper Chassis Assembly A5

Figure 5-9. AM-7148 Assembly Location Diagram (Sheet 2 of 4)



AM-7148 Cable Connector Locations

Figure 5-9. AM-7148 Assembly Location Diagram (Sheet 3 of 4)



AM-7148 Top View, Torquing Sequence

Figure 5-9. AM-7148 Assembly Location Diagram (Sheet 4 of 4)

5-10. RADIO SET CONTROL MAINTENANCE. Maintenance of the radio set control (REC) is accomplished in accordance with the following paragraphs. The support equipment required to perform the RSC maintenance procedures is listed in table 5-1. Refer to figure FO-15 for schematic diagram.

a. Operational Checkout. Operational checkout test for the RSC is accomplished by interfacing the RSC with Radio AN/GRM-116 Test Set (GRM-116 test set), and performing the performance test checks in section III. It is not necessary to perform the entire test. Perform only those checks necessary to verify the following: the RSC controls (transfers data) each rf subsystem; all audio functions and controls work properly; displays and backlighting functions correctly; and the RSC operates from internal battery source. The preliminary test setup must be performed prior to performing the operational test procedures.

(1) Preliminary Test Setup. Place the RSC on a clean work surface close to GRM-116 Test Set and perform the following steps:

(a) Place power switches on GRM-116 Test Set equipment to OFF position. On RSC under test, verify that BATTERY-ON/OFF switch is in OFF position.

(b) Connect equipment as shown in figure 5-10.

(c) Perform the performance test checks in section III. Preset all equipment associated with the test in accordance with the equipment preset instructions contained in section III.

b. Troubleshooting. Troubleshooting the RSC consists of performing the procedures in figure 5-11 to isolate faults to a replaceable assembly. Use the disassembly and reassembly procedures as necessary to replace the indicated assembly. Perform steps (a) and (b) of the preliminary test setup required for the operational checkout, and refer to figure 5-11 for trouble analysis diagrams. Components of the Receiver-Transmitter AN/GVM-9 Test Set are required to troubleshoot the RSC.

c. Battery Installation. The remote RSC requires batteries for power during remote operation. Use the following procedures to remove/replace batteries in the RSC:

(1) Place the RSC top down on a flat surface.

(2) Release latches on the back of the RSC case.

(3) Open battery access door.

(4) If installed, remove old batteries.

(5) Install new batteries with connectors down. Use care when mating battery connector with RSC.

(6) Close battery access door.

(7) Lock latches on RSC case.

d. Disassembly. Disassembly of the RSC is accomplished in accordance with the following procedures. See figure 5-13 for location of assemblies.

CAUTION

Assemblies A1A4, A2A1 and A2A2 contain electrostatic discharge sensitive (ESDS) devices. Use appropriate precautions while handling these assemblies.

(1) Place RSC on work surface with front panel facing up.

(2) Loosen nine captive screws on front panel.

(3) Separate front panel assembly from case assembly.

(4) Disconnect connector P1 from connector A1J1 on fiber optic module A1A4.

(5) Disconnect connector P2 from connector J4 on CCA A2A2.

(6) Alternately loosen two screws on connector P4. Disconnect P4 from connector J1 on backlighting driver assembly A1A2.

(7) Disassembly of Panel Assembly A2. To disassemble panel assembly A2, refer to figure 5-13 and proceed as follows.

(a) Remove four screws and flat washers from RSC front panel keyboard. Carefully lift and pull keyboard from RSC front panel.

CAUTION

When disconnecting the connectors, pull straight outward or damage to the connector pins could result.

(b) Carefully disconnect connectors P1 and P2 from connectors J1 and J2 respectively, on CCA A2A2.

(c) Loosen eight (8) captive screws on CCA A2A2.

(d) Carefully lift CCA A2A2 and A2A1 from the front panel assembly and disconnect connector P3 from connector J2 on CCA A2A1.

(e) Carefully separate CCA A2A2 from CCA A2A1.

(8) Removal of Fiber Optic Module A1A4. Refer to figure 5-13 and perform the following steps.

(a) Disconnect W1P1 from connector A1J1 on assembly A1A4.

(b) Remove jam nut (and attaching parts) from FIBER OPTIC connector on RSC case assembly.

(c) Carefully remove assembly A1A4 from RSC case assembly.

(9) Disassembly of Case Assembly A1. To remove subassemblies A1A1, A1A2 and A1A3 from the case assembly perform the following steps.

(a) Remove subassemblies A1A1 and A1A2 by loosening four captive screws on subassembly A1A1. Disconnect P1 from CCA A1A1, then lift and remove subassembly A1A1 from the case assembly.

(b) Lift subassembly A1A2, tag the three wires from the case assembly wiring harness connected to A1A2-E1, -E2 and -E4. Disconnect wires from A1A2-E1, -E2 and -E4.

(c) To remove subassembly A1A3, remove three crosshead screws from left side of case assembly. (Note and retain rubber washers removed with crosshead screws).

(d) Tag and disconnect five wires from the case assembly wiring harness connected to subassembly A1A3. Lift and remove A1A3 from case assembly.

e. Reassembly. Reassembly of the RSC is accomplished in accordance with the following procedures. See figure 5-13 for location of assemblies.

(1) Reassembly of Case Assembly A1. To install subassemblies A1A1, A1A2 and A1A3 in the case assembly perform the following steps.

(a) Connect five wires (as tagged during removal) from the case assembly wiring harness to subassembly A1A3.

(b) Position A1A3 in case assembly. Install and alternately tighten three crosshead screws with rubber washers into left side of case assembly. (Note condition of rubber washers replace as required).

(c) To install subassembly A1A2, connect three wires (as tagged during removal) from the case assembly wiring harness to A1A2-E1, -E2 and -E4. Position subassembly A1A2 into case assembly.

(d) Install subassembly A1A1 and tighten four captive screws on subassembly A1A1 to secure A1A2 and A1A1 to the case assembly. Connect P1 to CCA A1A1.

CAUTION

Assemblies A1A4, A2A1 and A2A2 contain electrostatic discharge sensitive (ESDS) devices. Use appropriate precautions while handling these assemblies.

(2) To install assembly A1A4 (fiber optic module), proceed as follows:

NOTE

Apply a thin film of grease per MIL-G-4343 to O-ring of A1A4 prior to installation.

(a) Position assembly A1A4 so that fiber optic connector will slide through FIBER OPTIC connector opening on RSC case assembly. Insure that connector A1J1 on A1A4 is positioned as shown in figure 5-13.

(b) Slide assembly A1A4 forward until it rests against case assembly. Install dust cap and jam nut; tighten jam nut to 15 foot pounds.

(c) Connect W1P1 to connector A1J1 on assembly A1A4.

(3) Reassembly of Panel Assembly A2. To reassemble panel assembly A2, refer to figure 5-13 and proceed as follows.

CAUTION

When disconnecting the connectors, pull straight outward or damage to the connector pins could result.

(a) Carefully mount CCA A2A2 on CCA A2A1 and connect front panel wiring harness connector P3 to connector J1 on CCA A2A1.

(b) Carefully position CCA A2A2 and A2A1 into the front panel assembly and alternately tighten eight captive screws on CCA A2A2.

(c) Carefully connect connectors P1 and P2 to connectors J1 and J2 respectively, on CCA A2A2.

(d) Position keyboard with connector and mounting holes on front panel. Carefully insert keyboard pins into front panel connector. Install and alternately tighten four screws and flat washers to secure keyboard to RSC front panel.

(4) Position connector P4 on backlighting assembly connector A1A2J1. Alternately tighten two screws on connector P4.

(5) Connect wiring harness connector P2 to connector J4 on CCA A2A2.

(6) Connect connector W1P2 to connector J3 on CCA A2A2. Ensure W1P1 is connected to A1J1 on F/O module A1A4.

(7) Position front panel assembly onto case assembly and alternately tighten nine captive screws.

WARNING

Lithium battery, part number BA-5590/U, has been identified as a hazardous item. Adherence to the following safety precautions checklist and procedures is mandatory.

5-10-1. SAFETY PRECAUTIONS CHECKLIST

The hazards of Li/SO2 batteries can be prevented by observing safety procedures described in thes checklist. The following lists will aid in determining when appropriate precautions are necessary.

a. Batteries - Nonoperational

(1) To avoid catastrophic rupture, ensure that vent device is not encased and that gas products can be dissipated.

(2) Primary cells of Li/SO2 type shall not be charged.

(3) Positive steps must be taken to assure that there is no external mechanical or electrical bridging of positive and negative electrodes to avoid direct or high-resistance shorting.

(4) Dispose of batteries that are leaking or deformed or the open circuit of which is less than 2.8V when measured with a high-impedence voltmeter. (See paragraph 2f entitled "Disposal.")

(5) Avoid placing batteries in storage environments (1 year) where the temperature is greater than 45° C for extended periods. A 60° C limit shall not be exceeded in storage areas. Any significant increase in temperature will result in a capacity-loss and/or internal bridging of the glass-to-metal terminal or venting.

(6) Lithium batteries shall not be discarded with general trash, or incinerated. (See paragraph 2f entitled "Disposal.") Each battery must be protected against puncturing, crushing, denting or any other physical deformation.

(7) leaking batteries shall be handled only when wearing rubber apron and gloves and a full faceshield, placed in plastic bags, and removed to a suitable storage or disposal area. (See paragraph 2b entitled "Handling.")

b. Batteries - Operational

(1) Terminate discharge when battery voltage drops to 2.0V (except for pulse or low-temperature operation when its use is approved).

(2) Minimize rate of discharge whenever possible. The maximum should not exceed 10-h rate (C/10).

(3) To optimize battery use, maintain the operating temperature in the range of -10° to 40° C.

(4) Avoid heat accumulation around batteries by providing adequate heat transfer away from cells. Excessive heat can cause battery venting. The maximum surface temperature must not exceed 60° C.

5-10-2. PROCEDURES

a. Use

(1) Inappropriate or careless application of lithium batteries has resulted in venting of internal gases, explosion and fires. For this reason, use of lithium batteries shall be limited to appropriate applications.

(2) Manufactures of lithium cells are cognizant of the potential hazard under certain conditions and have, therefore, incorporated various safety features into both individual and multicell batteries. Under no circumstances should these safety devices be bypassed or compromised.

(3) It is desirable for the command safety office to review and approve all uses of lithium batteries, their storage, and related equipment as well as their disposal and waste products.

b. Handling

(1) New Batteries

(a) Four major cautions must be emphasized in handling a usable lithium battery:

1. The battery casing must be protected from fracture, puncture or shearing. Liberation of internal components of the lithium cell posed the threat of fire, explosion and toxic or physical effects to personnel in close proximity to the damaged battery.

2. Excessive temperature excursions caused by discharge of the batteries at high rate (>C/10) must be avoided. Operating under conditions of high ambient temperature or in situations where thermal dissipation is minimized can result in excessive heat in battery. Sulfur dioxide can reach significant pressures quickly. The result is a venting of the so2 and electrolyte.

3. Under no circumstances shall lithium batteries be handled, placed or transported with flammable liquids or gasses or a significant concentration of flammable fumes.

4. Bridging (shorting) the case (anode) to the center post (cathode) with either a metal tool, equipment chassis or another cell casing must be avoided. Arcing at the anode can generate sufficient instantaneous heat to initiate battery venting, or, at the least, cause reduced service life of the battery.

(2) Discharged or Inoperative Batteries

(a) Batteries that have been used or stored for significant periods of time must be disposed of in the appropriate manner. Cautions shall be a chief consideration in all handling operations. To prepare for disposal and shipment, disconnect all electrical leads and allow batteries to stand in a well-ventilated area for a minimum of 24 hours to reduce activity of materials. Refer to paragraph 2f entitled "Disposal" for more detailed requirements and procedures.

c. Storage

(1) The requirements set forth in this section are intended for designated user storage areas; however, it is important that temperature be controlled under 50° C and ventilation be provided in any area where batteries are handled or used.

(2) Lithium batteries shall be stored in their original shipping containers in a cool, dry location away from personnel or vehicular trafficways. If original shipping containers are not available, storage containers should be obtained. These containers should be of strong fiberboard, wood, plastic, mental drums or other approved material. Individual batteries shall be sealed in plastic and these inner containers shall be surrounded with a minimum of one inch of vermiculite on all sides. Containers shall also be equipped with nonconductive dividers to prevent battery-to-battery contact.

(3) The storage area shall have adequate ventilation to prevent buildup of sulfur dioxide fumes in excess of 5 ppm.

(4) Storage areas shall be temperature controlled; temperatures above 50° C shall be avoided. No other materials commodity shall be stored in the same area with batteries. Smoking shall be strictly prohibited in battery storage locations with "No Smoking" signs posted in all prohibited areas.

(5) It is desirable that the storage facilities and firefighting provisions be reviewed and approved prior to placement of lithium batteries in any area. Once the storage area is approved and established, the quantity of batteries that are added to or removed from storage must be monitored. Significant (more than 10 percent) increases in the volume of stored batteries shall be noted so that any necessary additional provisions or alterations to the storage area or its fire-fighting equipment can be made.

d. Fire Protection

(1) A graphite-type compound or extinguisher such as Lith-X-type (class D) will extinguish burning lithium. Carbon dioxide and dry chemical extinguishers have been found to be ineffective in such fires and may, infact, tend to compound the problem of extinguishing the fire.Special instructions on the use of class D extinguishers should be issued as the operating techniques differ from those associated with other typed of extinguishers. "Hands-on" instruction is necessary for a reliable safety program.

(2) Although lithium reacts when water is applied, sprinkler systems are approved for areas where lithium batteries are stored and used. Should a fire involving lithium batteries generate sufficient heat to activate a sprinkler system, it is considered the best course of action to let the lithium expend itself and allow the sprinklers to "flood" the surrounding area. This will cool the batteries and surrounding combustibles, thereby minimizing further cell venting and propagation of the fire to other areas.

(3) All areas where lithium batteries are stored or used shall be equipped with a class "D" extinguisher. In the event that a class "D" is not available for any reason, a water extinguisher may be used, but efforts should be aimed at preventing the spread of fire to other combustibles and not directed on the burning lithium cells.

e. Transportation

(1) Transportation of lithium batteries by motor vehicle, rail freight, cargo vessel and "cargo only" aircraft has been authorized by the Department of Transportation under DOT Exemption DOT-E-7052. Batteries will not be shipped or transported as part of an experiment or in other instruments or equipment unless approved in the safety plan. Batteries must be packaged in compliance with DOT-E-7052. Future revisions shall be adopted as they become approved. Inspection and transportation shall be accomplished by the appropriate review and approval authority.

(2) Transportation of discharged lithium batteries shall conform to DOT Exemption DOT-E-8441.

f. Disposal

(1) Potentially Hazardous Batteries

(a) If any potentially hazardous battery (see * below) is discovered, the individual shall clear the area, contact the appropriate safety office and furnish the following information:

1. Type of battery

   a. Lithium/sulfur dioxide

   b. Lithium/thionyl chloride

   c. Other lithium type.

2. Manufacturer, model number, lot number or other pertinent identification on battery.

3. Number of batteries.

4. Physical dimensions of battery.

5. Ampere-hour capacity of battery and nominal voltage of item.

6. Case style:

   a. Crimped jacket

   b. Hermetically sealed

   c. Other

7. Specific condition of battery; e.g., charged, partially dis charged or fully discharged.

   a. The safety office/bioenvironmental engineers should come to the scene and assess the degree of hazard and arrange for and monitor the packing, crating and transportation operations to the waste storage facility.

   b. The bioenvironmental engineers shall then arrange for the battery to be transported to the waste disposal contractor.

*Potentially hazardous batteries - Batteries in one of the conditions:

(1) Are of nonvented case style construction

(2) Are of an unapproved design

(3) Are of crimp-style case construction

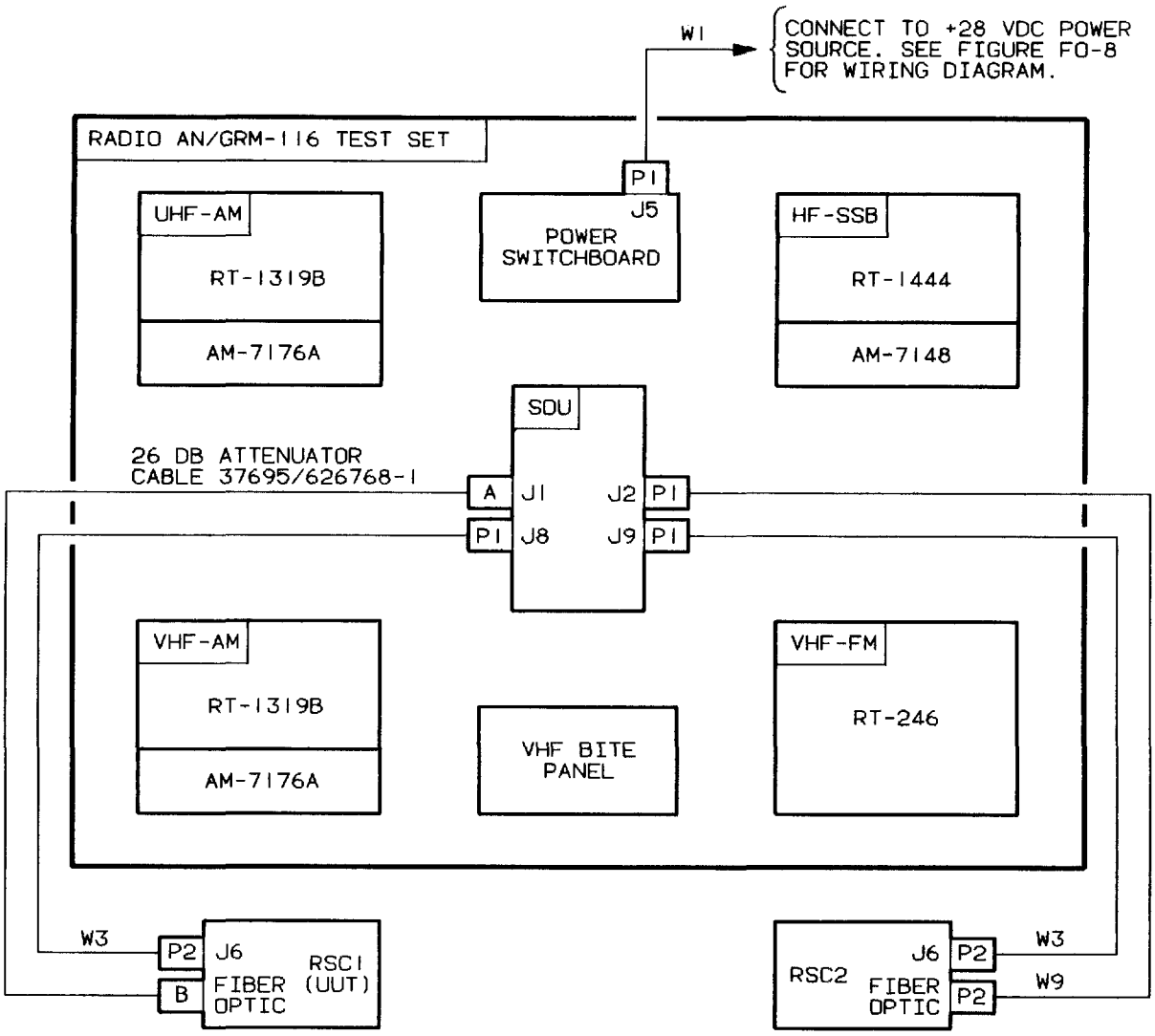
(4) Are of an unidentifiable type

(5) Are of unidentifiable constriction(e.g., corroded or encap sulated to hide construction features)

(6) Have been physically abused (e.g., dropped, crushed, sheared or punctured)

(7) Have seen operational abuse (e.g., high rate of discharge, shorted or anomaly during testing)

(8) Are leaking, corroded or bulged



NOTES:

1. CONNECT TEST EQUIPMENT AS REQUIRED IN TEST PROCEDURES.
2. THE 26 DB ATTENUATOR CABLE (37695/626768-1) IS PART OF RECEIVER-TRANSMITTER AN/GVM-9 TEST SET.
3. REFER TO FIGURE FO-7 FOR CABLE CONNECTIONS BETWEEN GRM-116 TEST SET EQUIPMENTS. CONNECT GRM-116 TEST SET EQUIPMENT FOR NONSECURE VOICE OPERATION, OR SET COMSEC EQUIPMENT TO PLAIN TEXT.
4. INSURE THAT EACH RADIO SET IS CONNECTED TO A DUMMY LOAD CAPABLE OF DISSIPATING THE MAXIMUM POWER OUTPUT FROM THE RADIO SET.

206(V)1,(V)2-I-16
MX-61-020-028
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Figure 5-10. Radio Set Control Test Setup

SYMPTOMS:

RSC DOES NOT OPERATE OR WILL NOT FUNCTION PROPERLY. GO TO 1.

BATTERY PROBLEMS. GO TO 6.

ELECTROLUMINESCENT PANEL (ELP) BACK-LIGHTING DOES NOT FUNCTION PROPERLY. GO TO 5.

POWER PROBLEMS DURING LOCAL OPERATION (LOW BATTERY INDICATION AT RSC). GO TO 2.

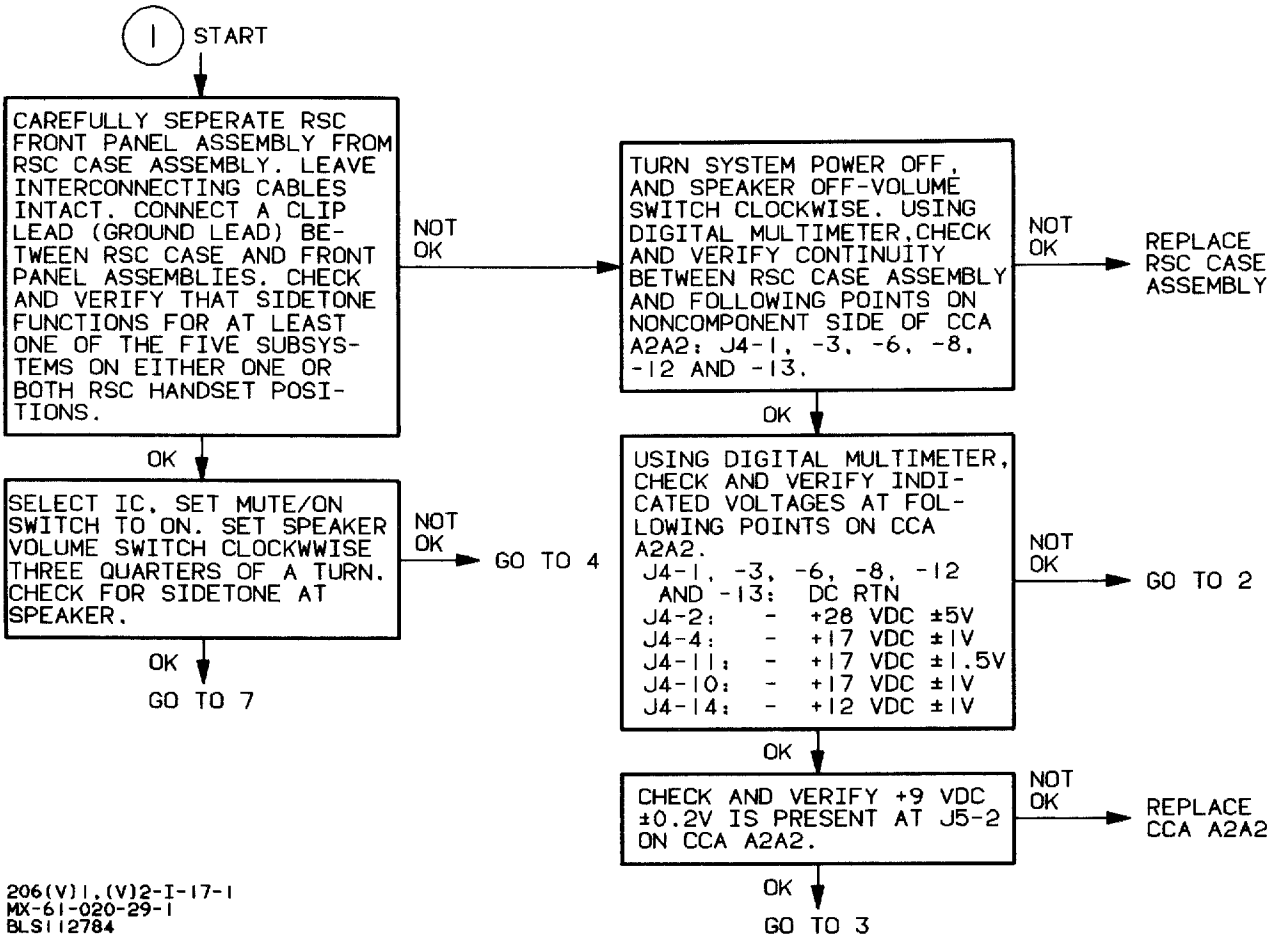


Figure 5-11. RSC Trouble Analysis Diagram (Sheet 1 of 7)

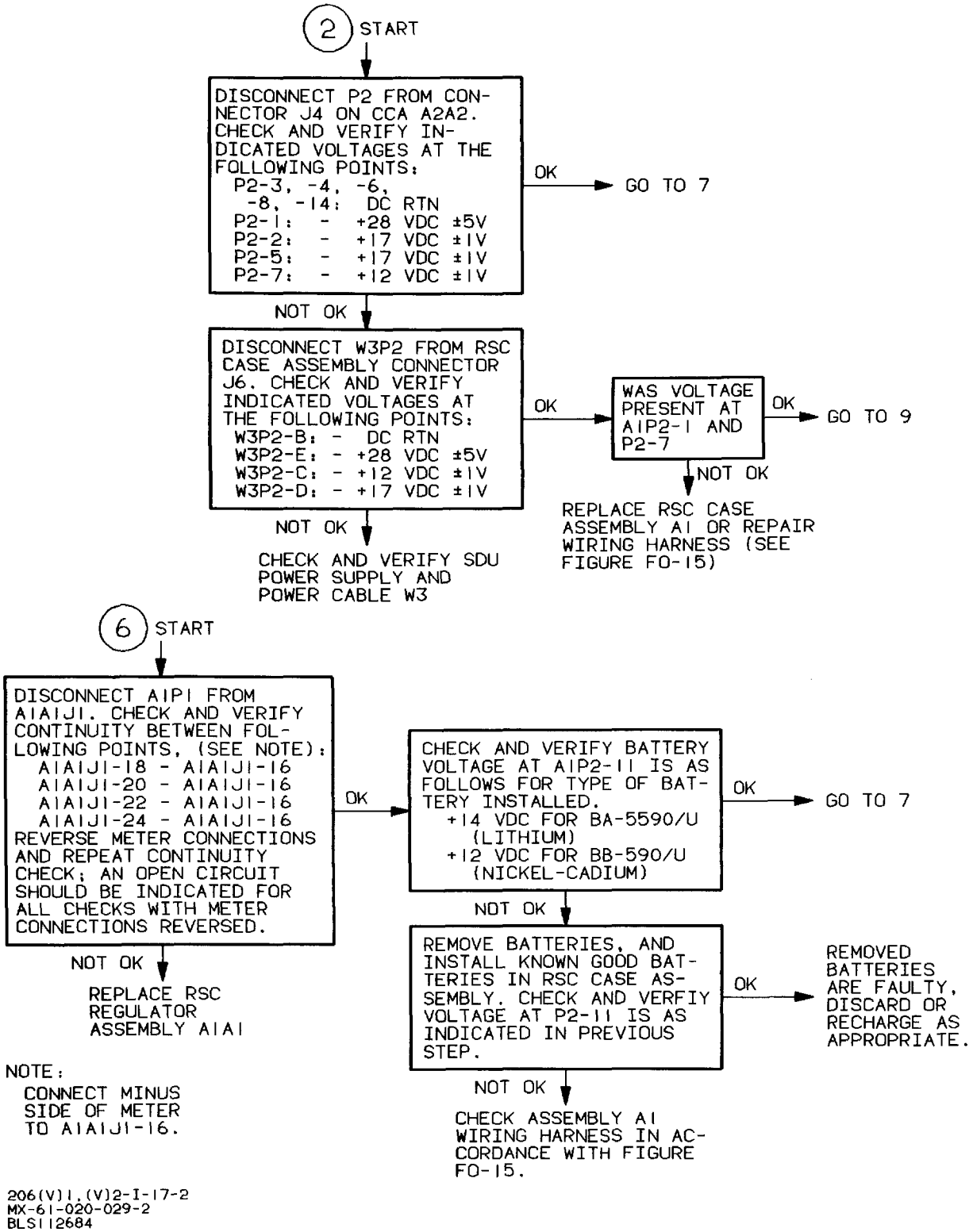


Figure 5-11. RSC Trouble Analysis Diagram (Sheet 2 of 7)

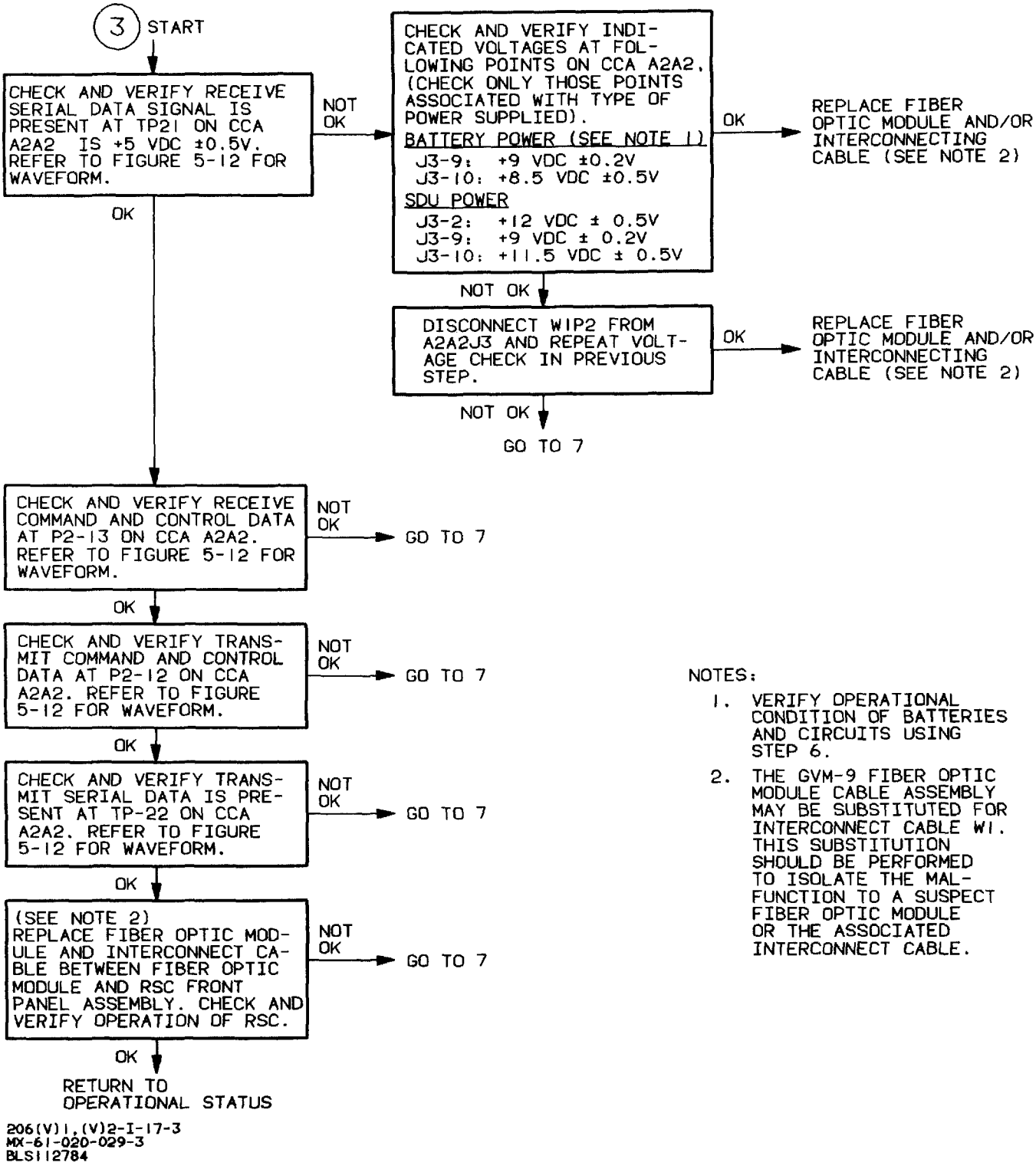


Figure 5-11. RSC Trouble Analysis Diagram (Sheet 3 of 7)

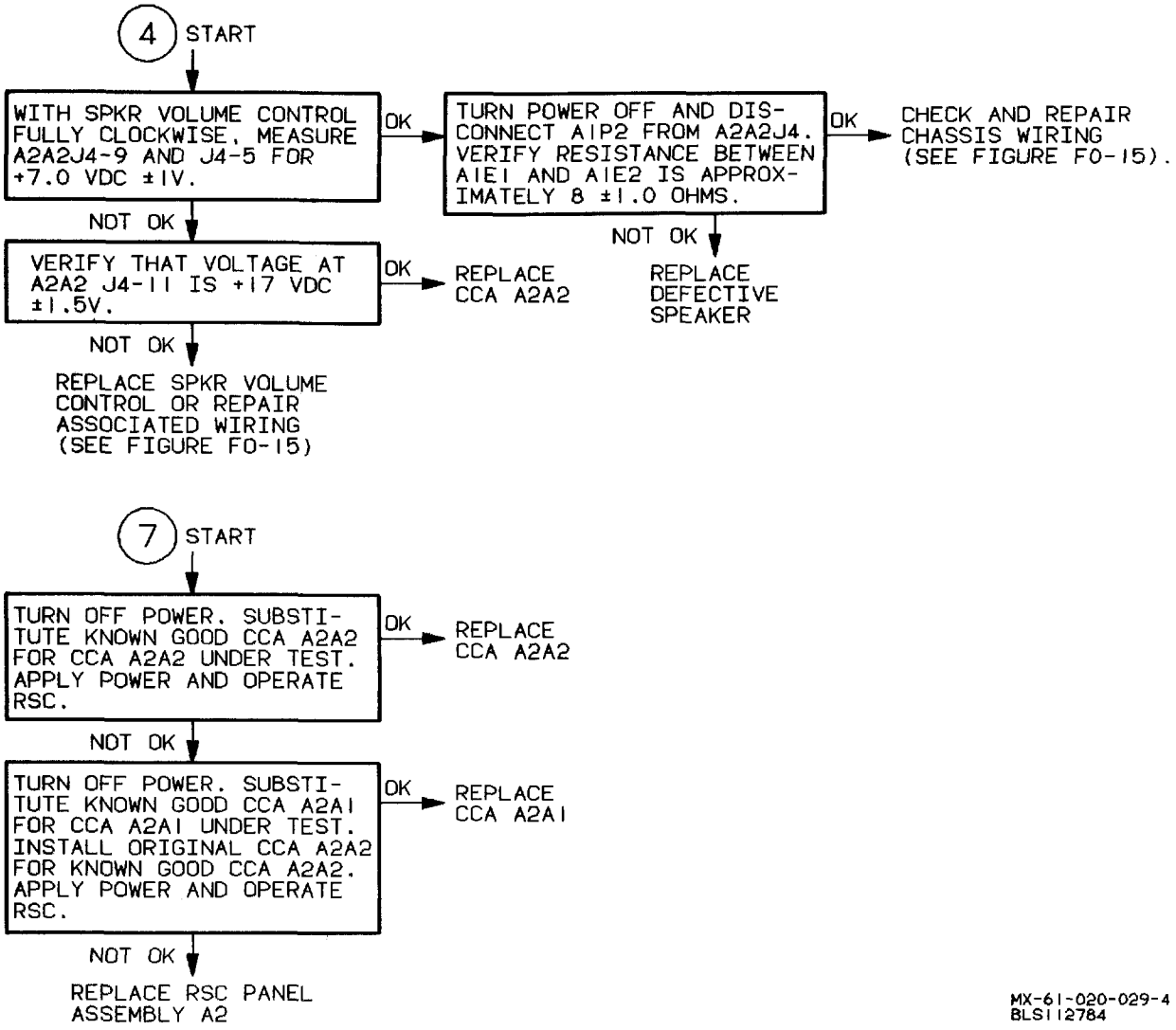


Figure 5-11. RSC Trouble Analysis Diagram (Sheet 4 of 7)

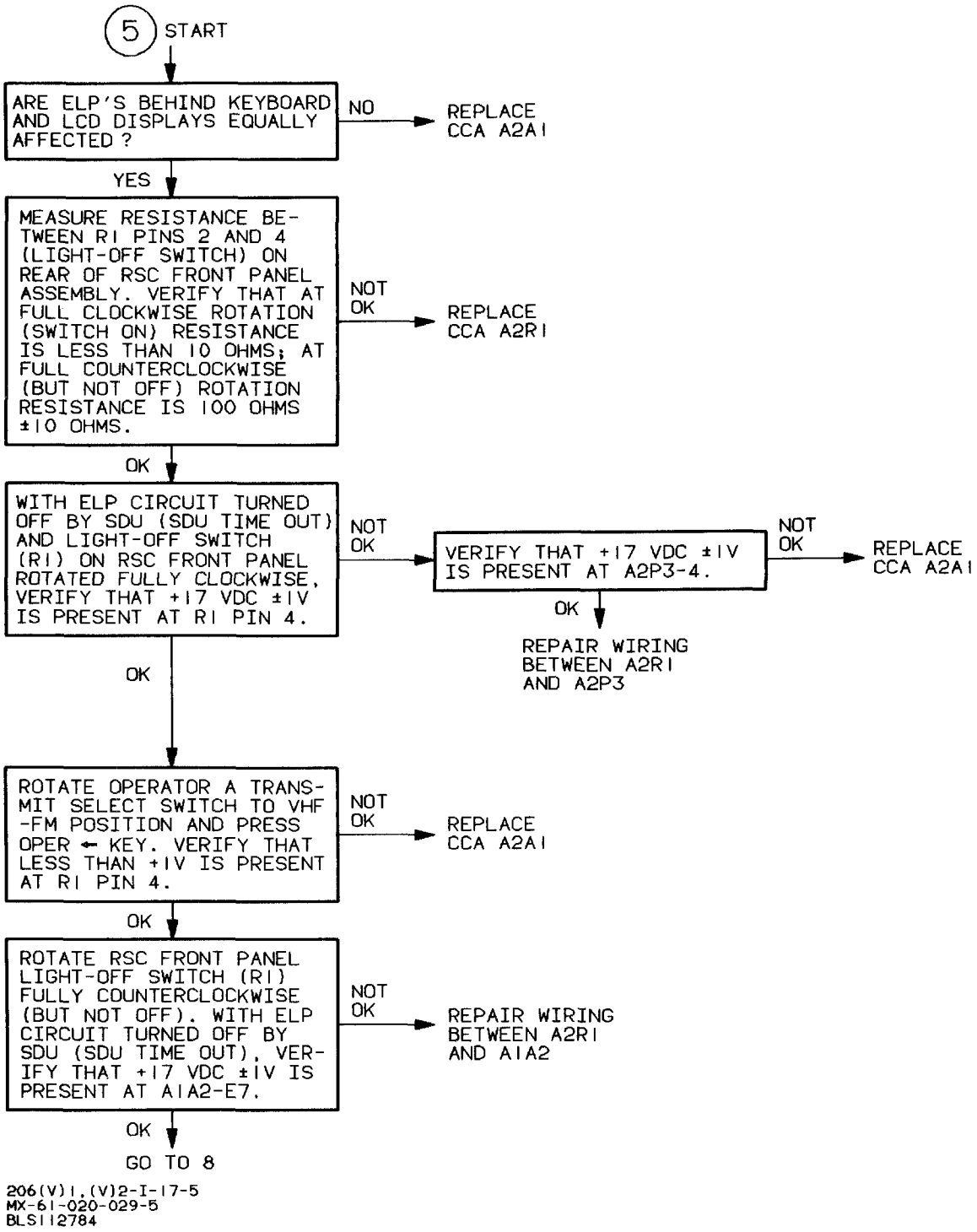


Figure 5-11. RSC Trouble Analysis Diagram (Sheet 5 of 7)

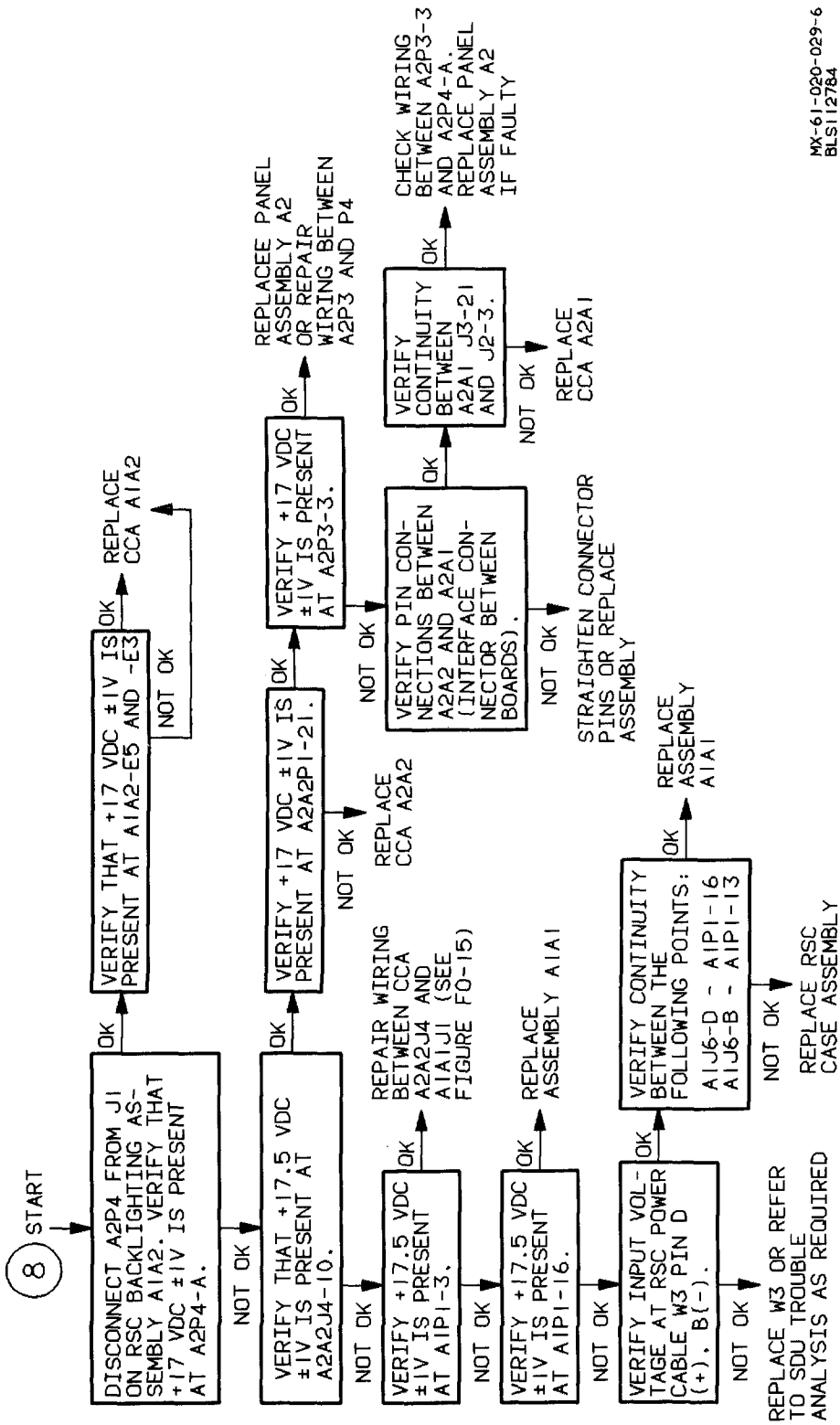


Figure 5-11. RSC Trouble Analysis (Sheet 6 of 7)

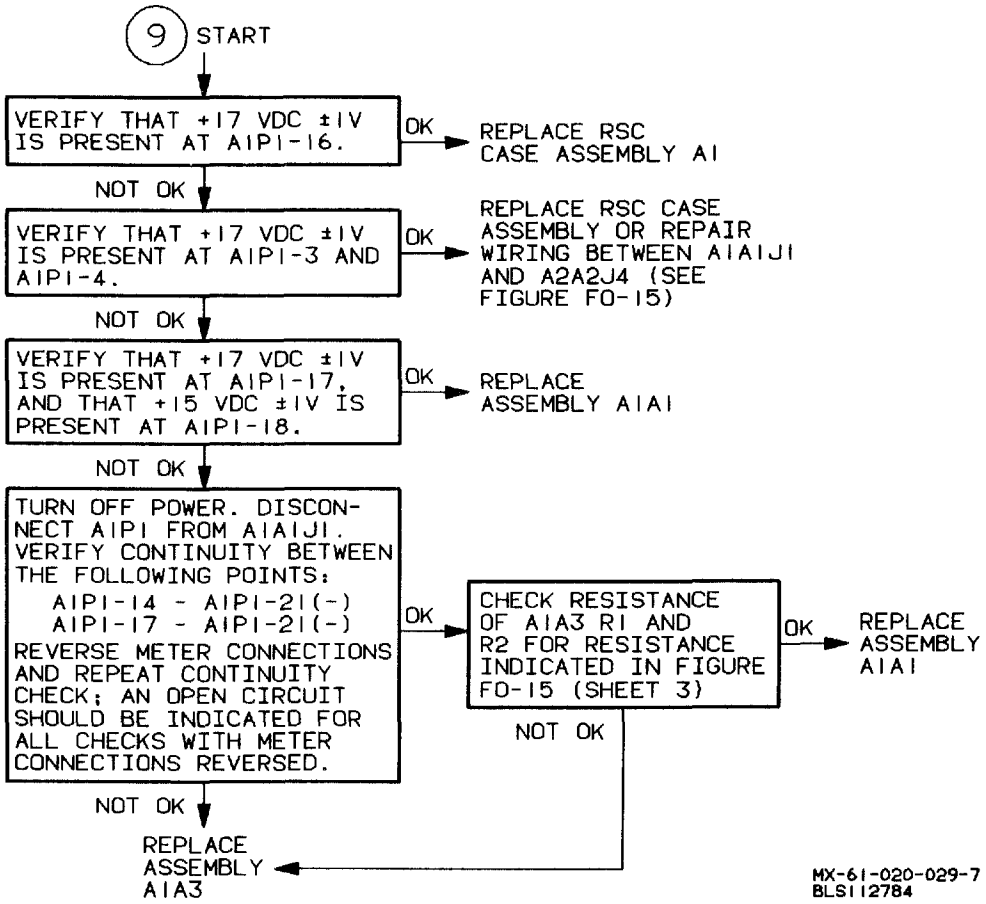
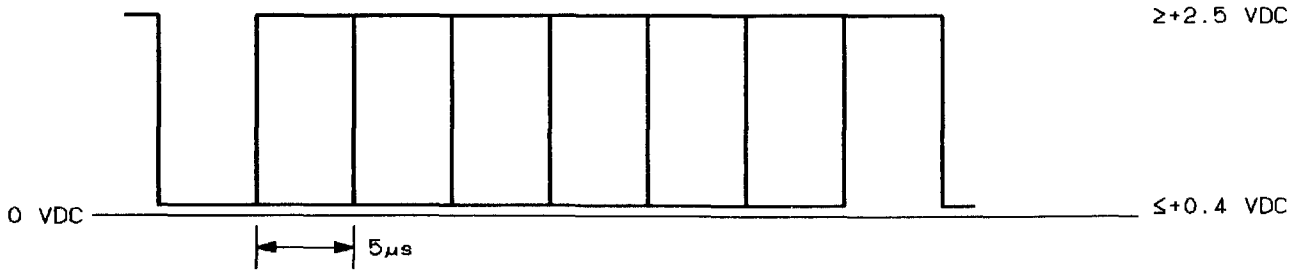
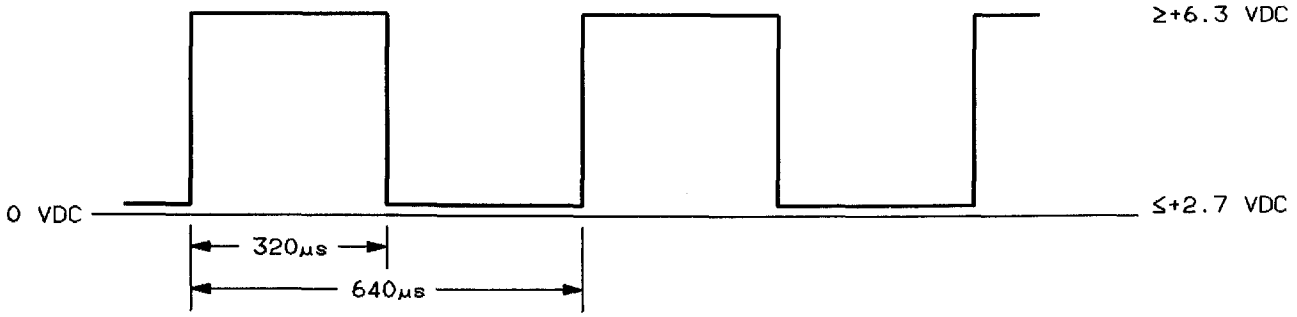


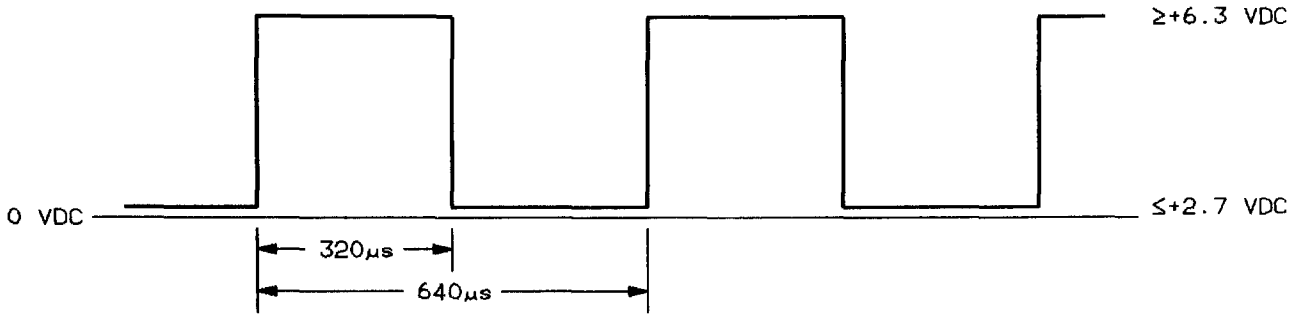
Figure 5-11. RSC Trouble Analysis (Sheet 7 of 7)



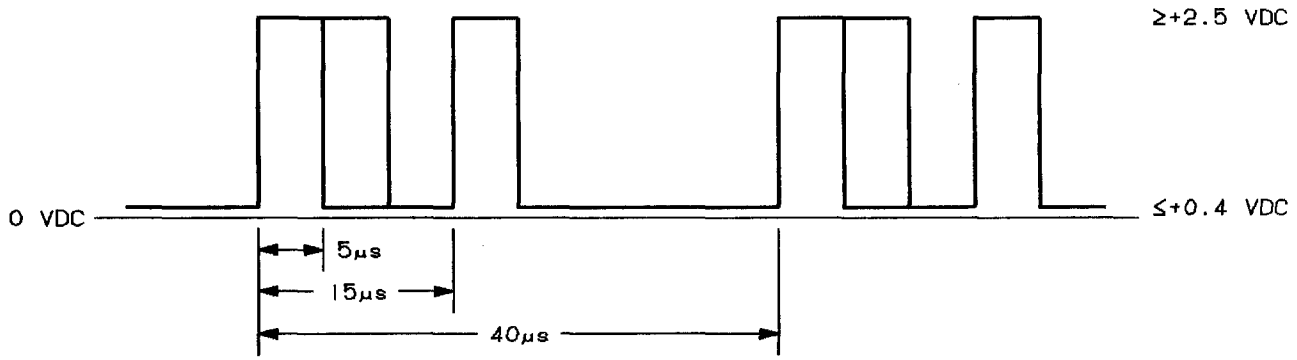
A. TP21, RCV SERIAL DATA TYPICAL WAVEFORM



B. P2-13, RCV CMD AND CTRL DATA TYPICAL WAVEFORM



C. P2-12, XMT CMD AND CTRL DATA TYPICAL WAVEFORM



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D. TP22, XMT SERIAL DATA TYPICAL WAVEFORM

Figure 5-12. RSC Trouble Analysis Waveform Diagram

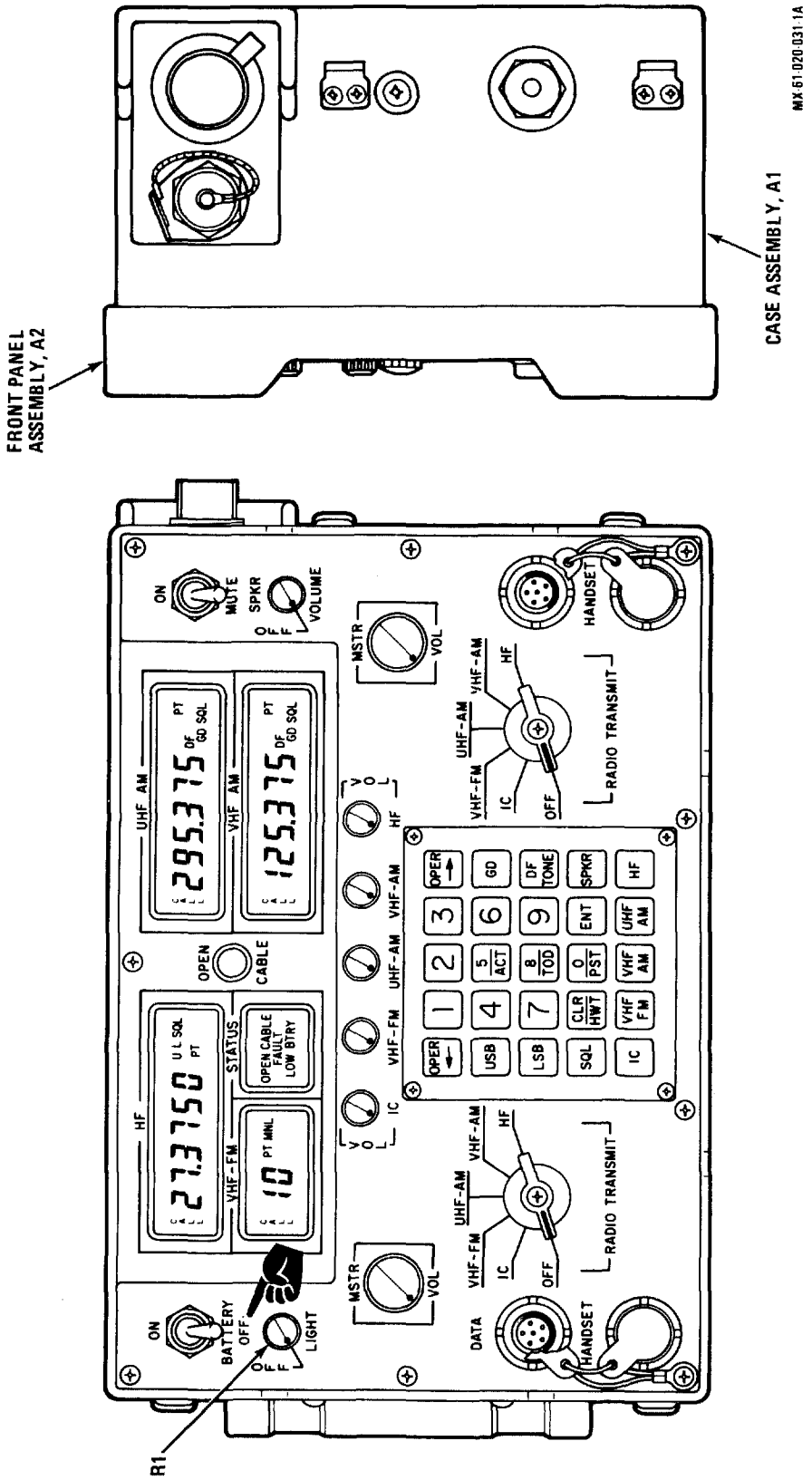


Figure 5-13. RSC Assembly Location Diagram (Sheet 1 of 3)

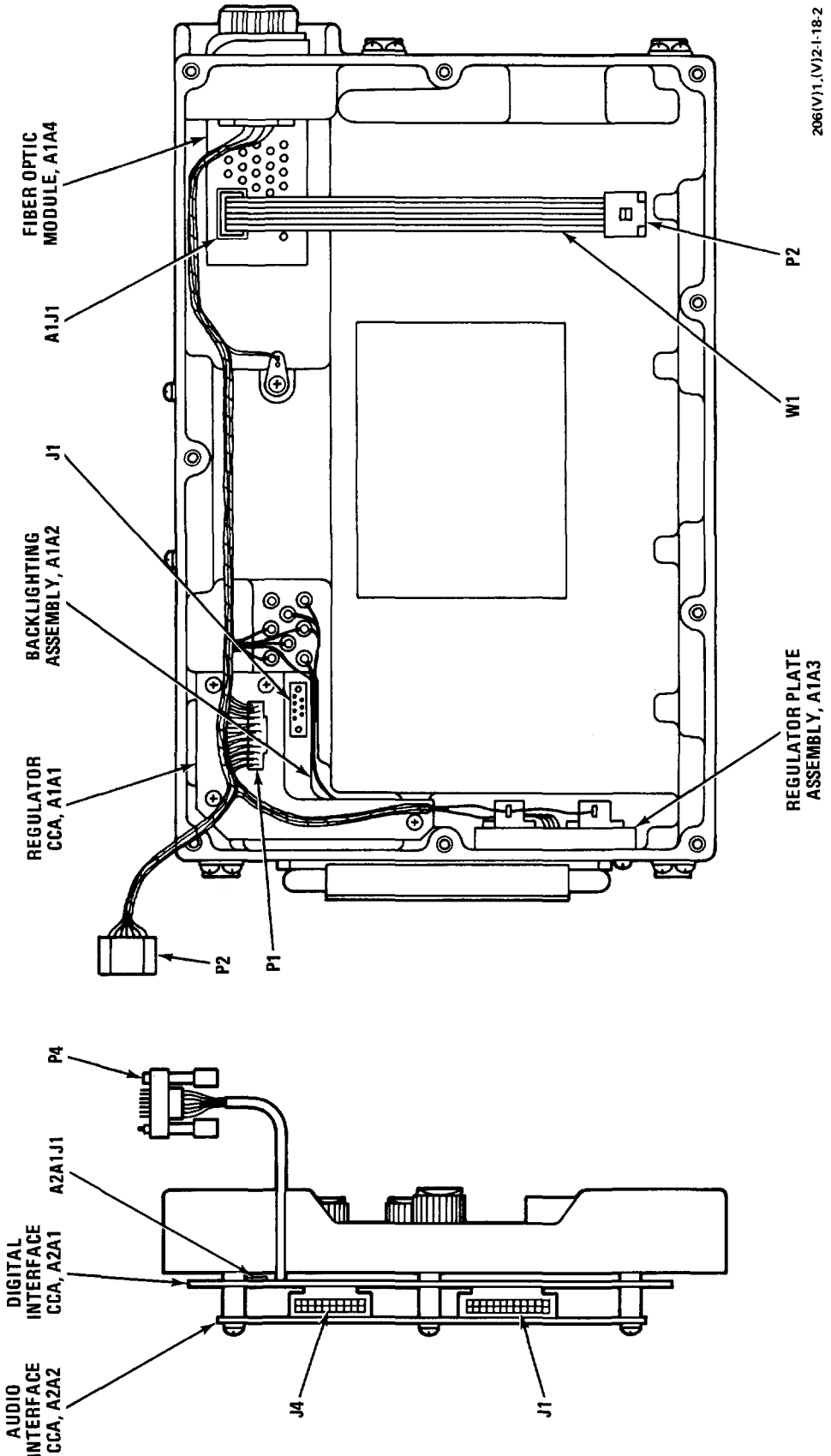
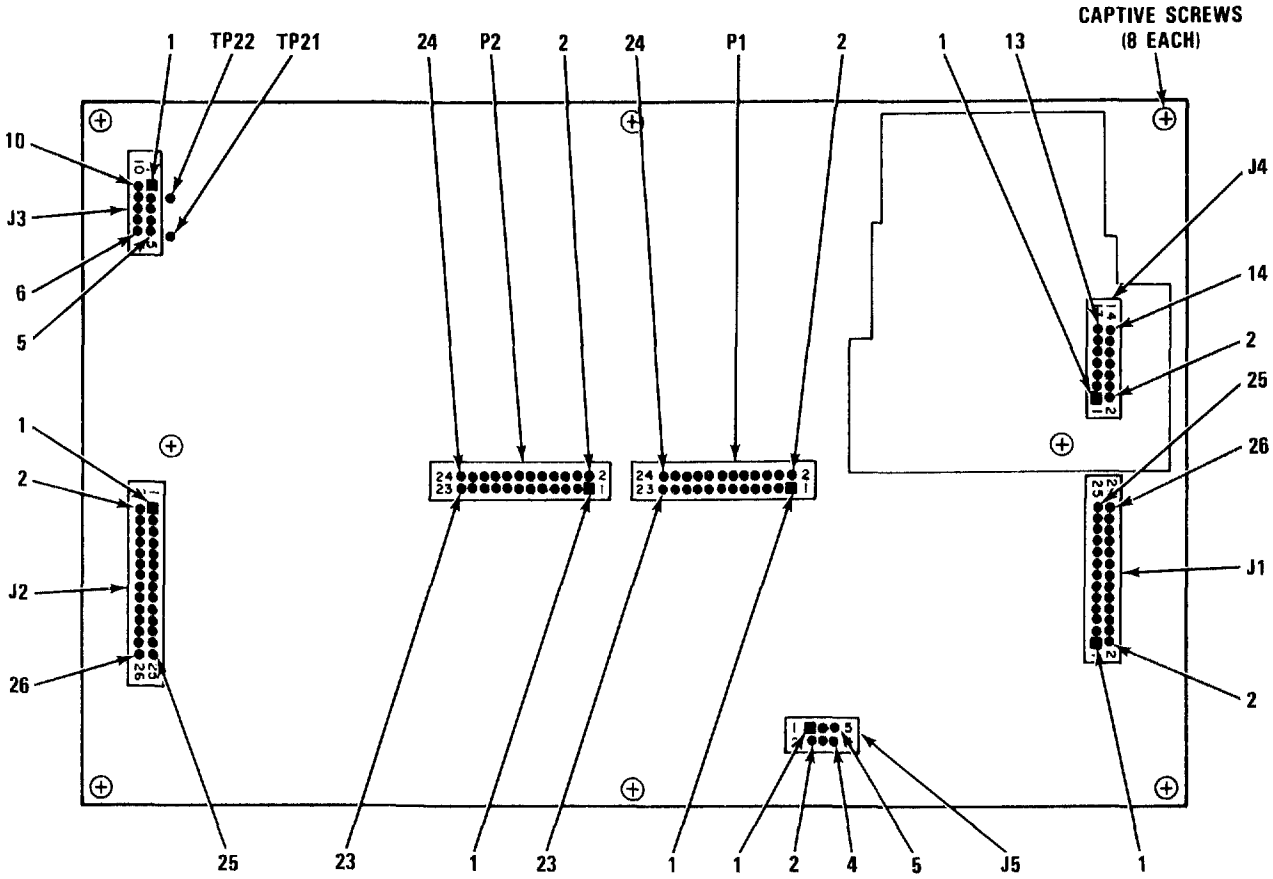
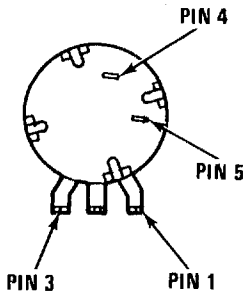


Figure 5-13. RSC Assembly Location Diagram (Sheet 2 of 3)



NON-COMPONENT SIDE OF AUDIO INTEFACE CCA A2A2



REAR VIEW OF OFF/LIGHT SWITCH (A2R1)

206(V)1,(V)2-I-18-3

Figure 5-13. RSC Assembly Location Diagram (Sheet 3 of 3)

5-11. VHF-FM RADIO MAINTENANCE. Maintenance of the VHF-FM radio (RT-246/VRC or RT-524/VRC) is accomplished in accordance with the following paragraphs. The support equipment required to perform the VHF-FM radio maintenance procedures is listed in table 5-1.

WARNING

RT-246/VRC, and RT-524/VRC weighs approximately 60 lbs (27.2 kg). Two person lift required.

a. Removal. Remove the VHF-FM radio from the equipment mounting rack in accordance with the following procedures. See figure 2-3 for component location.

(1) Turn off power to all Radio System equipment.

(2) Disconnect all cables connected to VHF-FM radio front panel connectors; replace connector covers.

(3) Loosen two thumbscrews on VHF-FM radio mount sufficiently to allow removal of VHF-FM radio.

(4) Pull VHF-FM radio from mounting tray.

b. Operational Checkout. Operational checkout test for the VHF-FM radio is accomplished by interfacing the VHF-FM radio with Radio AN/GRM-116 Test Set (GRM-116 Test Set), and performing the VHF-FM radio performance test checks in section III. The preliminary test setup must be performed prior to performing the operational test. If the VHF-FM radio fails to meet the required indications of the performance test checks in section III, refer to TO 31R2-2VRC-192 for detailed maintenance procedures.

WARNING

RT-246/VRC, and RT-524/VRC weighs approximately 60 lbs (27.2 kg). Two person lift required.

(1) Preliminary Test Setup. Place the VHF-FM radio on a clean work surface close to GRM-116 Test Set and perform the following steps:

(a) Place PWR (power) switches on GRM-116 Test Set equipment and the VHF-FM radio under test to OFF position.

(b) Remove known good VHF-FM radio from test station and set aside.

(c) Install VHF-FM radio under test into VHF-FM radio mounting tray of test station.

(d) Connect equipment as shown in figure 5-14.

(e) Perform the performance test checks in section III. Preset all equipment associated with the test in accordance with the equipment preset instructions contained in section III.

c. Troubleshooting. Troubleshooting procedures to isolate malfunctions to specific assemblies within the RT-246 or RT-524 are not contained in this manual. If the unit fails to meet required indications of the VHF-FM radio operational checkout test, refer to TO 31R2-2VRC-192 for additional testing and troubleshooting procedures.

d. Testing. Test the VHF-FM radio prior to installing it in the equipment mounting rack by performing the operational checkout test procedures.

WARNING

RT-246/VRC, and RT-524/VRC weighs approximately 60 lbs (27.2 kg). Two person lift required.

e. Installation. Install the VHF-FM radio in the equipment mounting rack in accordance with the following procedures. See figure 2-3 for component location.

(1) Insert VHF-FM radio into mounting tray and secure with two thumbscrew fasteners.

(2) Connect cable 4W15P3 to SDU connector (J3) on VHF BITE panel.

(3) Connect cable 4W15P2 to REMOTE connector (this step applies to RT-246/VRC only).

(4) Connect cable 4W16P2 to ANT connector.

(5) Connect cable W8P1 to ANT CTL connector.

(6) Connect cable 4W19P3 to X MODE connector.

(7) Refer to figure FO-7 and connect cables to meet desired Radio System configuration requirements.

5-12. VHF/UHF-AM RADIO SET MAINTENANCE. Maintenance of the VHF/UHF-AM radio set is accomplished in accordance with the following paragraphs. The support equipment required to perform the VHF/UHF-AM radio set maintenance procedures is listed in table 5-1.

a. Removal. Remove the VHF/UHF-AM radio set from equipment mounting rack in accordance with the following procedures. See figure 2-3 for component location.

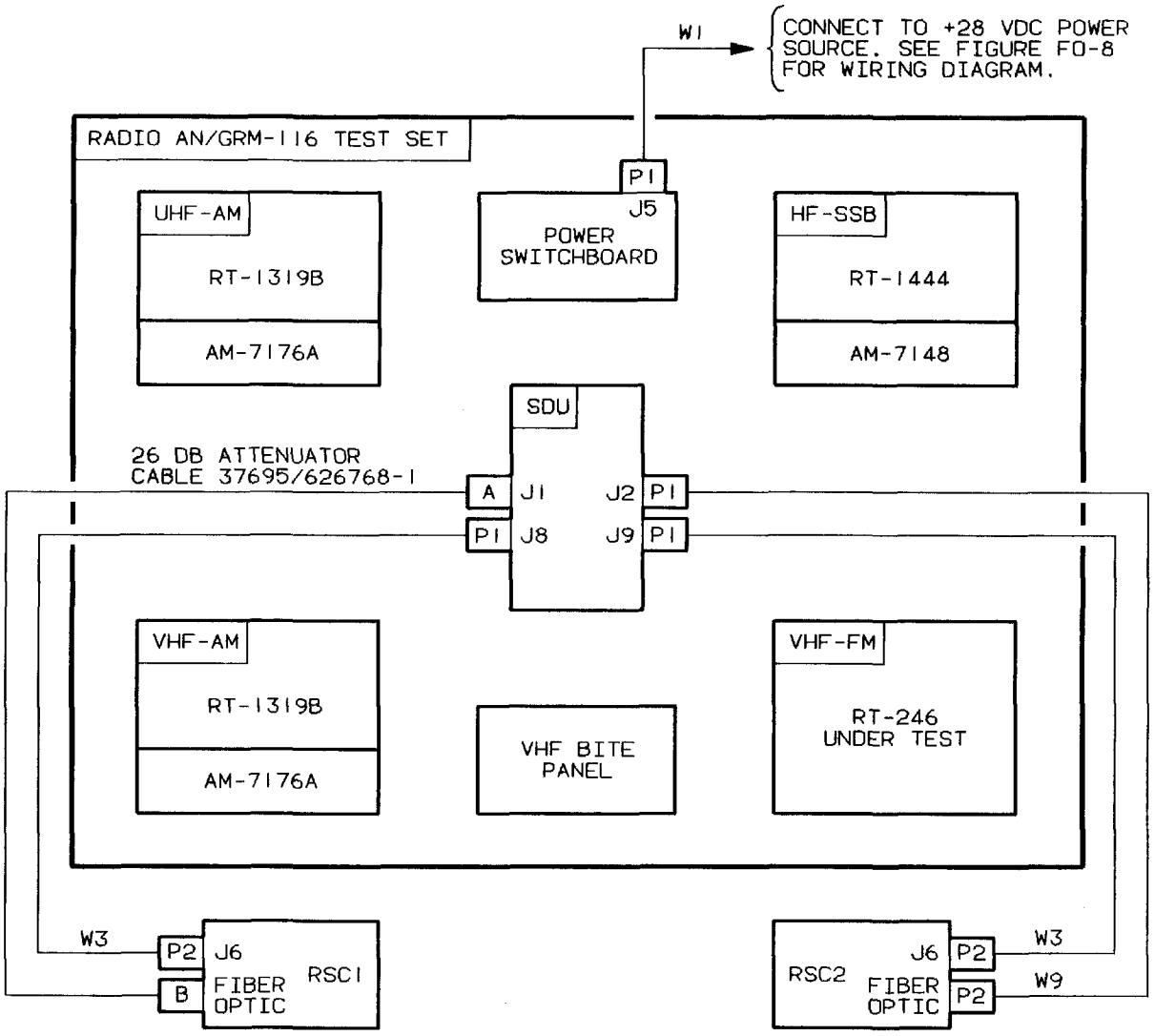
(1) Turn off power to all Radio System equipment.

(2) Disconnect all system interconnect cables connected to VHF/UHF-AM radio set designated for removal.

(3) On rear panel, disconnect cable 4W3P1 from connector J3.

(4) Loosen two thumbscrews on radio set mount sufficiently to allow removal of VHF/UHF-AM radio set.

(5) Pull VHF/UHF-AM radio set from mounting tray.



NOTE:

1. CONNECT TEST EQUIPMENT AS REQUIRED IN TEST PROCEDURES.
2. THE 26 DB ATTENUATOR CABLE (37695/626768-1) IS PART OF RECEIVER-TRANSMITTER AN/GVM-9 TEST SET.
3. REFER TO FIGURE FO-7 FOR CABLE CONNECTIONS BETWEEN GRM-116 TEST SET EQUIPMENTS. CONNECT GRM-116 TEST SET EQUIPMENT FOR NONSECURE VOICE OPERATION, OR SET COMSEC EQUIPMENT TO PLAIN TEXT.
4. INSURE THAT EACH RADIO SET IS CONNECTED TO A DUMMY LOAD CAPABLE OF DISSIPATING THE MAXIMUM POWER OUTPUT FROM THE RADIO SET.

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MX-61-020-032
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Figure 5-14. VHF-FM Radio Test Setup

b. Operational Checkout. Operational checkout test for VHF/UHF-AM radio set is accomplished by interfacing the VHF/UHF-AM radio set with Radio AN/GRM-116 Test Set (GRM-116 Test Set), and performing the VHF/UHF-AM radio set performance test checks in section III. The preliminary test setup must be performed prior to performing the operational test procedures. If the VHF/UHF-AM radio set fails to meet the required indications of the performance test checks in section III, refer to TO 31R2-2VRC83-2 for detailed maintenance procedures.

(1) Preliminary Test Setup. Place the VHF/UHF-AM radio set on a clean work surface close to GRM-116 Test Set and perform the following steps:

(a) Place power switches on GRM-116 Test Set equipment and VHF/UHF-AM radio set under test to OFF position.

(b) Connect equipment as shown in figure 5-15.

(c) Perform the performance test checks in section III. Preset all equipment associated with the test in accordance with the equipment preset instructions contained in section III.

c. Troubleshooting. Troubleshooting procedures to isolate malfunctions to specific assemblies within the VHF/UHF-AM radio set are not contained in this manual. Refer to TO 31R2-2VRC83-2 for detailed troubleshooting procedures.

d. Installation. Install the VHF/UHF-AM radio set in the equipment mounting rack in accordance with the following procedures. See figure 2-3 for component location.

(1) Insert VHF/UHF-AM radio set into mounting tray and secure with two thumbscrew fasteners.

(2) Connect power cable 4W3P1 to rear panel connector J3.

(3) Connect antenna cable (W5 for UHF-AM radio, W6 for VHF-AM radio) to ANT connector on AM-7176 front panel.

(4) Refer to figure FO-7 and connect cables to meet desired Radio System configuration requirements.

5-13. VHF BITE/AUDIO INTERFACE MAINTENANCE. Maintenance of the VHF BITE panel is accomplished in accordance with the following paragraphs. The support equipment required to perform the VHF BITE panel maintenance procedures is listed in table 5-1.

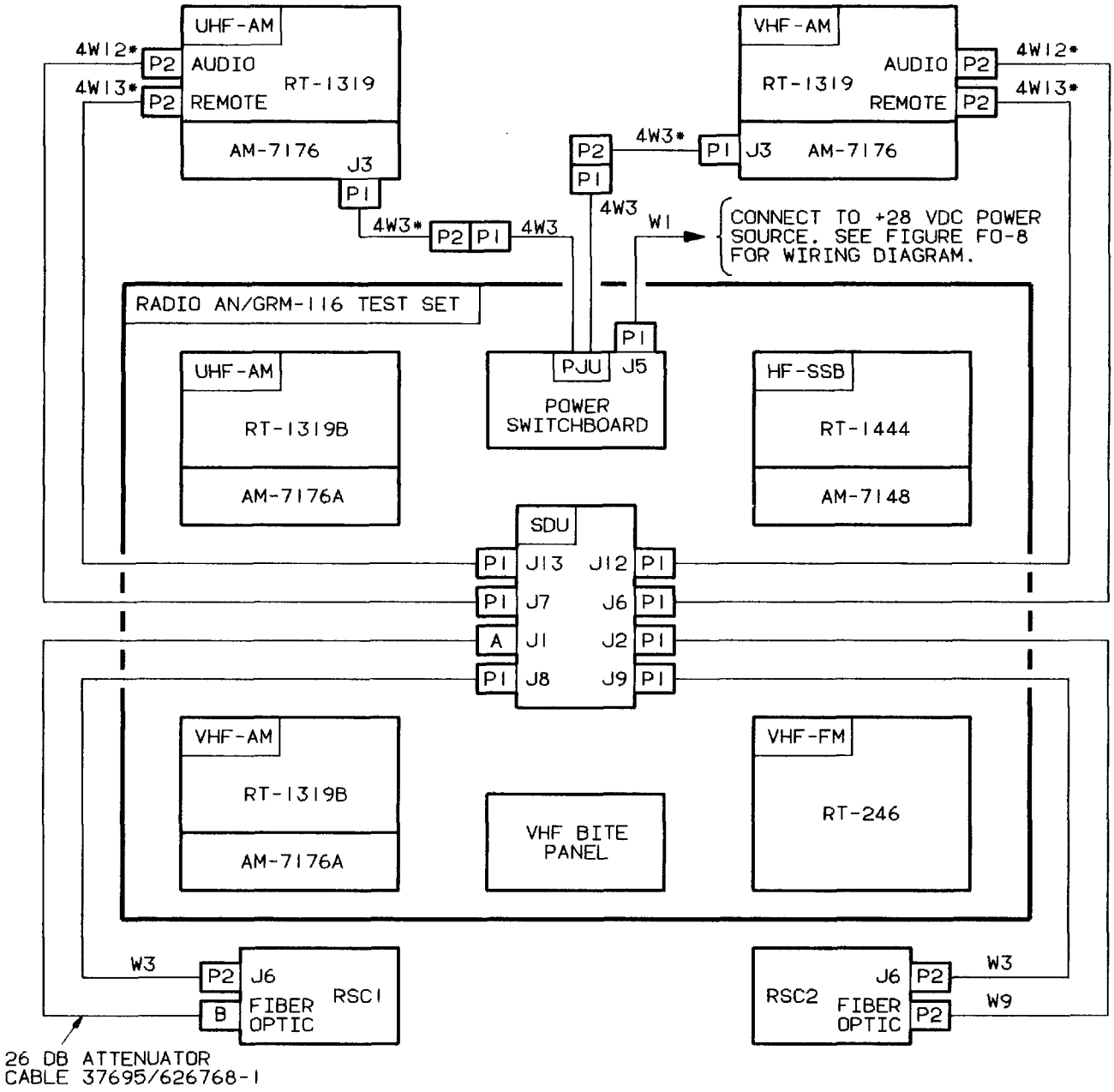
a. Removal. Remove the VHF BITE panel from the equipment mounting rack in accordance with the following procedures. Refer to figure FO-16.

(1) Turn off power to Radio System.

(2) Disconnect all cables connected to VHF BITE front and rear panel.

(3) Remove four screws and attaching hardware securing VHF BITE panel and bracket to equipment mounting rack.

(4) Remove VHF BITE panel and bracket.



NOTES:

1. CABLES SUFFIXED WITH AN ASTERISK * (e.g.4W13*) ARE PART OF THE ADAPTER CABLE TEST SET.
2. THE 26 DB ATTENUATOR CABLE (37695/626768-1) IS PART OF RECEIVER-TRANSMITTER AN/GVM-9 TEST SET.
3. CONNECT TEST EQUIPMENT AS REQUIRED IN TEST PROCEDURES.
4. REFER TO FIGURE FO-7 FOR CABLE CONNECTIONS BETWEEN GRM-116 TEST SET EQUIPMENTS. CONNECT GRM-116 TEST SET EQUIPMENT FOR NONSECURE VOICE OPERATION, OR SET COMSEC EQUIPMENT TO PLAIN TEXT.
5. INSURE THAT EACH RADIO SET IS CONNECTED TO A DUMMY LOAD CAPABLE OF DISSIPATING THE MAXIMUM POWER OUTPUT FROM THE RADIO SET.

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Figure 5-15. VHF/UHF Radio Set Test Setup

b. Operational Checkout. Operational checkout test for the VHF BITE panel is performed in accordance with the performance test checks in section III. The operational checkout is performed with the VHF BITE panel under test interfaced with Radio AN/GRM-116 Test Set (GRM-116 Test Set) to determine serviceability. If the required indications are not obtained, replace the VHF BITE panel.

(1) Preliminary Test Setup. Place VHF BITE panel on a clean work surface close to GRM-116 Test Set and perform the following steps:

(a) Place power switches on GRM-116 Test Set equipment to OFF position.

(b) Connect equipment as shown in figure 5-16.

(c) Perform VHF BITE panel checkout in accordance with the performance test checks in section III.

c. Troubleshooting. Troubleshooting the VHF BITE panel is limited to determining VHF BITE panel serviceability. This is accomplished by performing the operational checkout procedures, and replacing the VHF BITE panel if the required indications are not obtained. Refer to the operational checkout procedures.

d. Testing. Test the VHF BITE panel prior to installing it in the equipment mounting rack by performing the operational checkout procedures.

e. Installation. Secure the VHF BITE panel to the equipment mounting rack in accordance with the following procedures. Refer to figure FO-16.

(1) Position VHF BITE panel and bracket so that holes in mounting bracket and equipment mounting rack are aligned.

(2) Install and tighten four screws and attaching hardware to secure VHF BITE panel to equipment mounting rack.

(3) Refer to figure FO-7 and connect cables to meet desired Radio System configuration requirements.

5-14. EQUIPMENT MOUNTING RACK MAINTENANCE. Maintenance of the equipment mounting rack consists of removal and replacement of faulty cables, equipment mounts, the power junction unit (PJU) and the VHF BITE panel. Refer to the equipment mounting rack assembly diagram, figure FO-16, which illustrates the location of routed cables, mounts, the PJU and the VHF BITE panel. Use Radio System wiring diagram FO-8, when performing continuity checks on multiconductor cables to determine serviceability. Perform all maintenance on the equipment mounting rack in accordance with standard shop procedures. Maintenance of the VHF BITE panel is described in paragraph 5-13. Maintenance of the power junction unit is described in the following paragraph.

5-15. POWER JUNCTION UNIT MAINTENANCE. Maintenance of the power junction unit (PJU) will consists of removal/replacement of a faulty PJU or power distribution cable. Removal/replacement of faulty power distribution cables will require only partial disassembly of the PJU. Refer to figure FO-16 which illustrates the location of the PJU and routed power distribution cables.

a. Removal. To remove the PJU from the equipment mounting rack, refer to figure FO-16 and proceed as follows:

NOTE

Removal of the PJU is not required to remove/replace faulty power distribution cables.

(1) Remove Power Switchboard, refer to paragraph 5-8a.

(2) Locate and remove six crosshead screws and lock washers (three each side) securing PJU to power switchboard mount.

(3) Locate all power distribution cables routed from the PJU.

(4) Remove retaining straps that secure power distribution cables to the equipment mounting rack.

(5) If the Radio System is an AN/GRC-206(V)1, power distribution cables with a reference designation of 4W5 must also be disconnected from the circuit breakers on the associated COMSEC equipment (KY-57) mounts.

(a) Remove two crosshead screws securing circuit breaker mounting bracket to COMSEC equipment mount.

(b) Remove circuit breaker from mounting bracket.

(c) Disconnect power distribution cable from circuit breaker.

(6) Remove PJU and associated power distribution cables from equipment mounting rack.

b. Disassembly. To remove power distribution cables connected to the PJU, refer to figure 5-17 and proceed as follows:

NOTE

Replacement of a power distribution cable is limited to the availability of spare sockets in the terminal boards of the power junction unit. If all spare sockets have been used, perform the PJU removal procedures. Return the PJU and associated cables to depot.

(1) Locate PJU at rear of equipment mounting rack.

(2) Loosen six captive crosshead screws on PJU top cover; remove top cover.

(3) At terminal boards (TB1, TB2 and TB3) of PJU, carefully cut lead wires of the power distribution cable designated for removal from the PJU.

(4) Internal to the PJU remove jam nut from bulkhead feedthru bushing of cable designated for removal.

(5) Remove power distribution cable from PJU.

(6) If the Radio System is an AN/GRC-206(V)1 and the power distribution cable has a reference designation of 4W5, perform the following steps.

(a) Locate the circuit breaker on the COMSEC equipment (KY-57) mount associated the removed power distribution cable.

(b) Remove two crosshead screws securing circuit breaker mounting bracket to COMSEC equipment mount.

(c) Remove circuit breaker from mounting bracket.

(d) Disconnect power distribution cable from circuit breaker.

c. Installation. To install power distribution cables into the PJU, refer to figure 5-17 and perform the following steps:

NOTE

Replacement of a power distribution cable is limited to the availability of spare sockets in the terminal boards of the power junction unit. If all spare sockets have been used, perform the PJU removal procedures. Return the PJU and associated cables to depot.

(1) Remove jam nut from bulkhead feedthru bushing of power distribution cable.

NOTE

Apply a thin firm of grease per MIL-G-4343 to O-ring seal of bulkhead feedthru bushing prior to installation.

(2) Install bulkhead feedthru bushing through opening where designated cable will be installed. Install and tighten jam nut onto bulkhead feedthru bushing.

(3) Locate spare socket (note size of socket contact) in each of the PJU terminal boards (TB1, TB2 and TB3).

(4) Insert lead wires of installed cable into spare socket of terminal boards; red wire to TB1, black wire to TB3, and green wire to TB2.

(5) Replace PJU top cover; tighten six crosshead screws.

(6) If the Radio System is an AN/GRC-206(V)1 and the power distribution cable has a reference designation of 4W5, perform the following steps.

(a) Locate circuit breaker on the COMSEC equipment (KY-57) mount associated with the installed power distribution cable.

(b) Install electrical insulation sleeving over two remaining wires of cable 4W5.

(c) Connect wires of power distribution cable 4W5 to circuit breaker.

(d) Secure circuit breaker and mounting bracket to COMSEC equipment mount with two crosshead screws.

d. Replacement. To install the PJU, refer to figure FO-16 and perform the following steps.

(1) If the Radio System is an AN/GRC-206(V)2 proceed to step (2). If the Radio System is an AN/GRC-206(V)1 perform the following steps:

(a) Locate three circuit breakers on the COMSEC equipment (KY-57) mounts.

(b) Install electrical insulation sleeving over each wire of the molded two wire conductor on three 4W5 cables.

(c) Connect two red wires of cable 4W5 to each of three circuit breakers.

(2) Position the PJU at the rear of the power switchboard mount, then tighten six crosshead screws.

(3) Locate power distribution cables from the PJU; route cables as shown in figure FO-16.

(4) If the Radio System is an AN/GRC-206(V)2 proceed to step (5). If the Radio System is an AN/GRC-206(V)1 perform the following steps:

(a) Using attached hardware, secure each circuit breaker connected to cable 4W5 to a circuit breaker mounting bracket.

(b) Secure each mounting bracket to the associated COMSEC equipment mount with two crosshead screws.

(5) Secure all cables with retaining straps as shown in figure FO-16.

5-16. FIBER OPTIC LINK MAINTENANCE. Maintenance of the fiber optic link (i.e., fiber optic cables and connectors of the fiber optic modules) is limited to performing the cleaning procedures provided in this paragraph. Due to the operating environment, connectors of the fiber optics cables/modules may require cleaning before and during operation. Fiber optic link cleaning will require a cleaning kit (PN 741889-801) consisting of the items listed in table 5-7.

Table 5-7. Items Required for Fiber Optic Link Maintenance

Part Number	Description	Purpose
40-7212	Polishing Cleaner	Burnishes terminus lens
3	Optical Cleaner	Removes minor dirt and oils
73	Lens Paper	Lint free cleaning paper
8564	Cleaner Dispenser	
N8184	Magnifying Glass	Used to inspect lens and terminus

a. Disassembly. All fiber optic connectors of the F/O cables and F/O modules require the same care in cleaning. Figure 5-18 illustrates the fiber optic connector disassembly diagram. Disassemble the F/O connectors only to the extend required for cleaning. To disassemble any F/O connector proceed as follows:

(1) Disconnect the F10 cable (or remove dust cap) from the optical connector.

(2) Pull the alignment sleeve from the main body of the F/O connector in a straight motion.

b. Cleaning. Clean the optic terminus and remove any debris from the F/O connector in accordance with the following procedures:

(1) Remove any debris from the F/O connector by brushing. If the connector is too dirty, it may be necessary to wash it with clean, clear water.

(2) Dry the connector and sleeve with a dry, lint free cloth.

(3) Apply a few drops of Isopropyl Alcohol (P/N 2200200) on lens paper (P/N 73).

(4) Wipe the ends of the optical terminus with the dampened lens paper.

(5) With a polishing cleaner (P/N 40-7212), buff the optical terminus using a circular motion.

(6) Inspect the optical terminus with a magnifying glass (P/N N8184). If lint deposits are found on the face of the optical terminus, peel back the adhesive backing on the polishing cleaner, and with a rolling motion, press the adhesive back to the lens to remove lint.

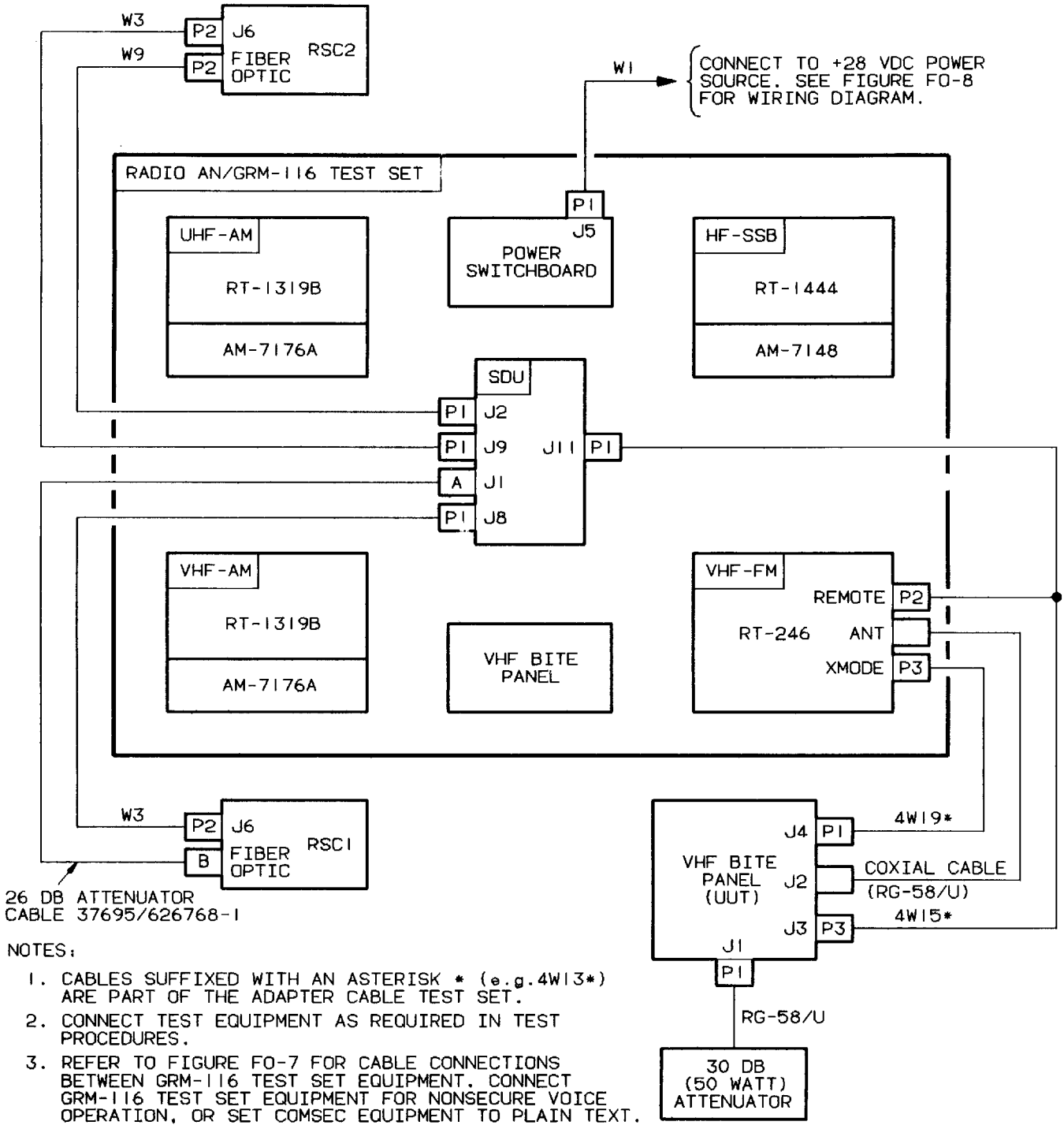
(7) Perform another inspection to insure that all debris has been removed from the terminus.

(8) Inspect alignment sleeve terminus guides and clean if necessary.

c. Reassemble. To reassemble the F/O connector, refer to figure 5-18 and proceed as follows:

(1) Carefully align the terminus guides and tabs of the alignment sleeve with the connector body.

(2) Push the alignment sleeve into the connector body until it is firmly seated.

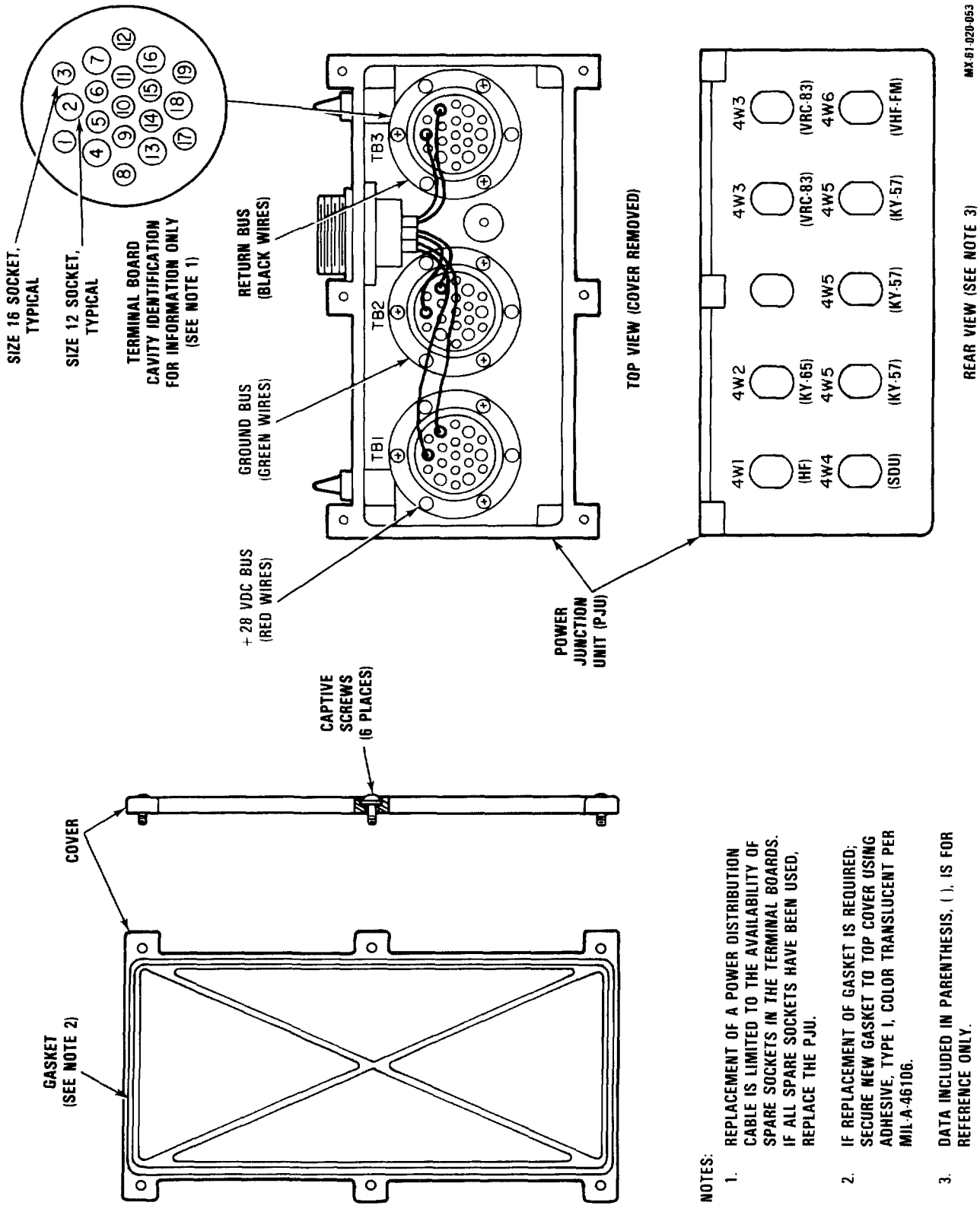


NOTES:

1. CABLES SUFFIXED WITH AN ASTERISK * (e.g.4W13*) ARE PART OF THE ADAPTER CABLE TEST SET.
2. CONNECT TEST EQUIPMENT AS REQUIRED IN TEST PROCEDURES.
3. REFER TO FIGURE FO-7 FOR CABLE CONNECTIONS BETWEEN GRM-116 TEST SET EQUIPMENT. CONNECT GRM-116 TEST SET EQUIPMENT FOR NONSECURE VOICE OPERATION, OR SET COMSEC EQUIPMENT TO PLAIN TEXT.
4. INSURE THAT EACH RADIO SET IS CONNECTED TO A DUMMY LOAD CAPABLE OF DISSIPATING THE MAXIMUM POWER OUTPUT FROM THE RADIO SET.

206(V)1,(V)2-I-43
MX-61-020-034
BLS091284

Figure 5-16. VHF BITE Panel Test Setup



NOTES:

1. REPLACEMENT OF A POWER DISTRIBUTION CABLE IS LIMITED TO THE AVAILABILITY OF SPARE SOCKETS IN THE TERMINAL BOARDS. IF ALL SPARE SOCKETS HAVE BEEN USED, REPLACE THE PJU.
2. IF REPLACEMENT OF GASKET IS REQUIRED; SECURE NEW GASKET TO TOP COVER USING ADHESIVE, TYPE I, COLOR TRANSLUCENT PER MIL-A-46106.
3. DATA INCLUDED IN PARENTHESIS, ( ), IS FOR REFERENCE ONLY.

Figure 5-17. PJU Disassembly Diagram

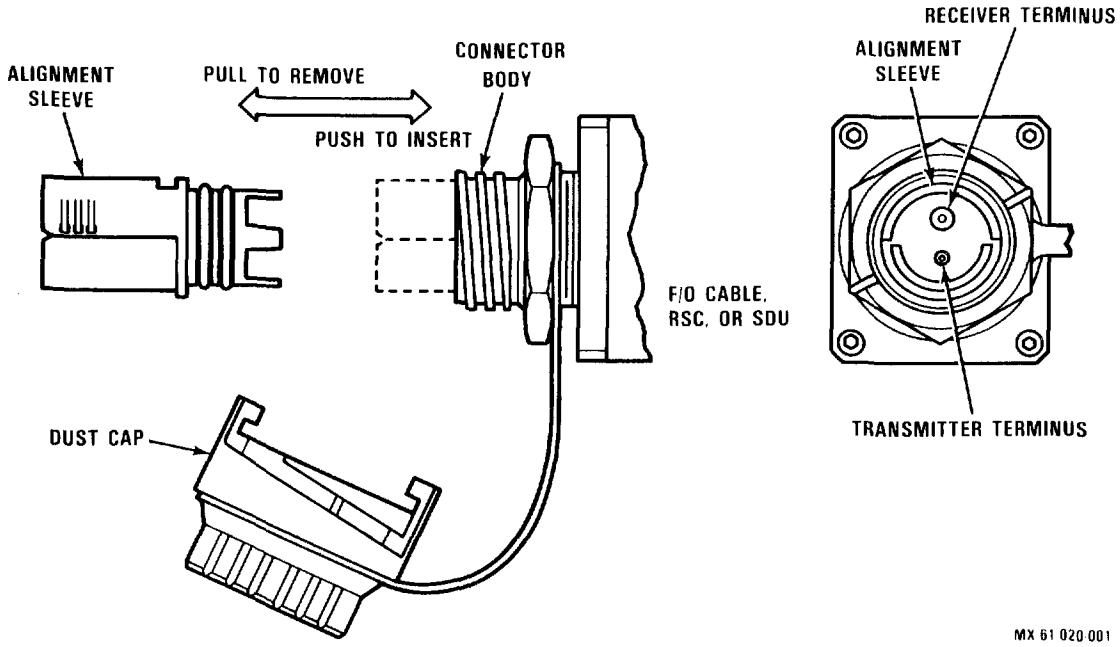


Figure 5-18. Fiber Optic Connector Disassembly Diagram

Section II. SPECIAL MAINTENANCE

5-17. SPECIAL MAINTENANCE. Special maintenance is accomplished at the Technological Repair Center (TRC). Instructions for TRC level maintenance are provided in TO 31R2-2GRC206-12.

Section III. PERFORMANCE TEST CHECKS

5-18. GENERAL. This section contains instructions for accomplishing all performance test necessary to insure that the Radio System meets minimum performance standards. Perform this test to verify the general performance of the Radio System and to determine serviceability. If an incorrect indication is obtained during the test, refer to the Radio System trouble analysis diagrams in section I. Minimum performance test do not include performance of detailed performance tests for the VHF-FM or the VHF/UHF-AM radio sets. Instructions for these radio sets are found in the related technical manuals listed in table 1-8.

5-19. PERFORMANCE TEST TABLE. The Radio System performance test table is presented in table 5-8. The test procedures provide an overall test of the Radio System under normal operating condition. The performance tests are made at the outputs and inputs of the equipment. The test set up required to perform the performance test checks are shown in block diagrams and referenced within the associated test procedures. For Radio Systems containing voice security equipment, voice security equipment may remain installed, but set voice security equipment for plain text mode of operation.

NOTE

The minimum performance tests are accomplished for nonsecure voice operation only. Remove COMSEC equipment found to be defective during operation. COMSEC devices are tested and maintained in accordance with the related manuals. Detailed operator instructions are contained in TO 31R2-2GRC206-1.

5-20. SPECIAL TEST EQUIPMENT. Standard test equipment is employed in most performance testing. However, the following special purpose test equipment is also used in performance testing.

a. Radio AN/GRM-115 Test Set. Radio AN/GRM-115 test set (GRM-115 test set), part number 707257-801, is used to input and measure test signals. Normal presets prior to testing are as follows:

(1) CLOCK ENABLE. Set to OFF.

(2) CIPHER/PLAIN SELECT Switch. Set to PLAIN.

(3) PTT Switch. Set to RECEIVE.

(4) +24 VDC POWER Switch. Set to OFF.

(5) REMOTE SELECT Switches. Set all switches to zero (0) position.

b. Receiver-Transmitter AN/GVM-9 Test Set. Receiver-Transmitter AN/GVM-9 test set (GVM-9 test set), part number 707293-801, contains a two channel 30 dB attenuator cable assmbly. The attenuator cable, part number 37695/626768-1, is a fiber optic cable which simulates fiber optic transmissions under maximum and minimum expected signal levels. The cable provides less than 5 dB attenuation on one channel and 26 ±2 dB on the other channel to simulate local (20 ft, 6 m) and remote (9,843 ft, 3 km) RSC deployment, respectively. During performance testing, some procedures will be performed with the attenuator cable connected between the RSC and SDU; then the attenuator cable connections at the RSC and SDU will be reversed and the procedures repeated. This will test the RSC and SDU fiber optic modules receive and transmit capabilities under minimum and maximum signal conditions.

5-21. VHF/UHF-AM RADIO SET TEST. Connect or verify that the VHF/UHF-AM radio set is properly interconnected for nonsecure voice operation as shown in figure FO-7. Preset the controls as follows:

a. DIM Control. Fully counterclockwise.

b. SQUELCH Control. Fully counterclockwise (no squelch threshold set).

c. VOLUME/OFF. Fully counterclockwise (OFF).

d. BYPASS/PA. Set to PA (Power Amplifier on).

e. SPKR VOL/OFF. Fully counterclockwise (OFF).

f. PWR - ON/OFF. Set to OFF.

g. ANT (AM-7176). Connected to a dummy load capable of dissipating in excess of 50 watts.

h. Preset the following VHF-AM and UHF-AM operating frequencies prior to starting the minimum performance tests. Upon initial power-up, preset frequencies will remain in the nonvolatile memories and may be changed during the performance tests.

UHF	VHF
P1 - 229.225 MHz	P1 - 119.425 MHz
P4 - 288.775 MHz	P4 - 140.425 MHz
P8 - 351.050 MHz	P8 - 138.050 MHz

NOTE

The UHF/VHF-AM radio transmit tests (table 5-8; VHF-AM step 111, and UHF-AM step 163) requires the use of an oscilloscope. If the frequency range of the oscilloscope is not sufficient to measure UHF and VHF frequency signals, mixing of signals may be required. If mixing is required, a RF signal generator is to be used as the mixing source. Setup the signal generator for an unmodulated signal at 0.5 Vrms and approximately 3 megahertz above the UHF/VHF operating frequency.

5-22. HF-SSB RADIO SET TEST. Connect or verify that the HF-SSB radio set is properly interconnected for nonsecure voice operation. Preset the controls as follows:

a. LSB/USB. Either position.

b. MODE. Any position.

c. SQL/VOL. Three-fourths (3/4) turn clockwise.

d. POWER-RESET/OFF. Set to OFF.

e. VOLUME/OFF. Fully counterclockwise (OFF).

f. 50 OHM/ANTENNA TERM. To 50 OHM with a dummy load capable of dissipating in excess of 150 watts. When bench testing the HF radio set using the antenna simulator, set to ANTENNA TERM position.

g. MONITOR/TEST. Set to SYSTEM STATUS.

5-23. VHF-FM RADIO TEST. Connect or verify that the VHF-FM radio is properly interconnected for nonsecure voice operation. Test presets will vary, depending on type of VHF-FM radio set used within the Radio System. Set the VHF-FM radio set controls as follows:

a. BAND. RT-524, set to A (30 to 52 MHz) band. RT-246, set to AUTO.

b. POWER. Set to OFF.

c. MC-TUNE-KC. For RT-524 only, manually tune radio set to 46.00 MHz. On RT-246 only, manually tune the following frequencies in the indicated preset channels. Consult TO 31R2-2VRC-221 for instructions to preset VHF-FM preset channels.

P1 - 34.20 MHz	P6 - 55.00 MHz
P2 - 41.00 MHz	P7 - 60.00 MHz
P3 - 46.00 MHz	P8 - 65.00 MHz
P4 - 47.50 MHz	P9 - 69.00 MHz
P5 - 49.80 MHz	P10 - 72.00 MHz

d. SQUELCH. Any OFF position.

e. VOLUME. Fully clockwise.

f. ANT. Terminated into a dummy load capable of dissipating up to 50 watts of power.

5-24. SIGNAL DISTRIBUTION UNIT TEST. Connect or verify that the SDU is properly interconnected for nonsecure voice operation. Set the PWR-RESET/OFF circuit breaker to OFF position.

5-25. POWER SWITCHBOARD TEST. Connect or verify that the power switchboard does not have any connections made to the front panel AUXILLARY 28 VDC terminal connectors or to J1, J2 or J3. Set all three circuit breakers to OFF position.

5-26. RADIO SET CONTROL TEST. The two RSC's may be configured in various ways, but for the purpose of the Radio System performance test, configure the RSCs as shown

in figure FO-7. The RSC configured as UNIT 5 will be referenced as RSC-1. The RSC configured as UNIT 6 will be referenced to as RSC-2. During the performance test, the left operator position of either RSC is referenced as operator A position. The right operator position of either RSC is referenced as operator B position. Preset both RSCs as follows:

a. BATTERY-ON/OFF Switch. Set to OFF.

b. MUTE/ON Switch. Set to ON.

c. LIGHT/OFF Control. Three-fourths (3/4) turn clockwise.

d. SPKR-VOLUME/OFF Control. Three-fourths (3/4) turn clockwise.

e. MSTR-VOL Controls (2). Three-fourths (3/4) turn clockwise.

f. RADIO TRANSMIT Switch. Set to OFF.

g. VOL Controls (5). Fully counterclockwise.

5-27. TEST EQUIPMENT. No test equipment presets are furnished by this manual. However, directions for changes e.g., setting for frequency, amplitude and types of signals are given during the tests. These instructions are general and do not refer to a particular model of test equipment. Required test equipment, or their equivalents are listed in table 5-1. Audio signal generation and measurement contained within the minimum performance tests are based on an audio distortion analyzer which provides an oscillator, distortion measuring set and an rms voltmeter, e.g., HP-339A Distortional Analyzer.

5-28. RADIO SYSTEM TEST POWER SOURCE. During the performance test, the Radio System may be powered by the vehicle power source, an auxiliary motor generator or a bench power supply which is capable of providing up to 20 amperes and +28 Vdc. During test for VEHICLE OVERRIDE, a power source must be connected to J4 for the required indication. The power switchboard power source selector switch should be set to a position corresponding to the connectors J4 or J5, i.e., AUX M/G (J5), VEHICLE or VEHICLE OVERRIDE (J4). To simulate operating from VEHICLE OVERRIDE while in a shop environment or while operating from an auxiliary motor generator, connect the power to power switchboard connector J4. The VEHICLE OVERRIDE position is only tested to demonstrate the Radio System capability to operate in that power mode. If the Radio System is connected to a vehicle battery source and VEHICLE OVERRIDE is selected at the power switchboard, do not continue in this power configuration for long periods of time without starting the vehicle engine to recharge the batteries. The AUX M/G (or equivalent 28 Vdc @ 50A power supply) must be used to test the four transmitter mode.

5-29. INTERCOMMUNICATION TEST. Intercommunication (Intercom) test procedures are provided to insure that intercommunication is possible between the RSC's and Intercommunication Set AN/VIC-1 (VIC-1). This test is performed with the VIC-1 equipment set to the INT ONLY position. Refer to TM 11-5830-340-12 for detailed operating procedures on Intercommunication Set AN/VIC-1(V).

Table 5-8. Performance Test Checks

Step	Procedure	Required Indication
	SYSTEM POWER UP TESTS **NOTE** Power must be connected to J4 from a vehicle or to a bench source to simulate vehicle power during steps 1 through 5. Power cable W1 from AN/GRM-116 may be used in a shop environment. If a bench source is used to simulate a vehicle power source, the white pressure sensor line of W1 must be grounded to operate with power selector switch in the VEHICLE POSITION.	
1.	With power connected to J4 on power switchboard, set power selector switch to VEHICLE OVERRIDE.	VEHICLE OVERRIDE lamp lit.
2.	Use DVM to measure voltage at power switchboard J3 (RFO power) (pin A 27 VDC) (pin B DC RTN) and turn PWR-RESET OFF switch to RESET. **NOTE** When powered from an AUX M/G or power supply at J4, readings may be set to proper input level (+27.5 VDC) by adjusting the source. When operating from the vehicle, readings will vary and correspond to power available from the vehicle battery. If operating from a bench source, the pressure sensor line must be connected to ground or the vehicle must be running in order to perform the next step.	+22.5 to +30.0 Vdc (+27.5 Vdc normal). Power switchboard INPUT POWER meter measures approximately the same as DVM. POWER lamp lit.
3.	On the power switch board, set power select switch to VEHICLE. Verify voltage on INPUT POWER meter.	POWER lamp remains lit. Meter reads +22.5 to +30.0 Vdc (+27.5 Vdc normal). VEHICLE OVERRIDE lamp goes out.

Table 5-8. Performance Tect Checks - Continued

Step	Procedure	Required Indication
4.	Set AUXILLARY 28 VDC terminal circuit breaker to RESET. Use DVM to measure voltage present at any AUXILLARY 28 VDC terminal.	+22.5 to + 30.0 Vdc (+27.5 Vdc normal), DVM reading approximately the same as INPUT POWER meter.
5.	Set AUXILLARY 28 VDC receptacle circuit breaker to RESET. Use DVM to measure voltage at J1 or J2: (pin A 27 VDC) (pin B DC RTN).	DVM reads +22.5 to +30.0 Vdc (+27.5 Vdc normal).
6.	On power switchboard, set PWR RESET-OFF circuit breaker to OFF. Turn off power source and connect to J5 on power switchboard. Turn on power source.	
	a. ON POWER SWITCHBOARD, set PWR RESET-OFF CIRCUIT BREAKER TO RESET.	Power lamp lit. Input PWR meter reads +22.5 to +30.0 VDC (+27.5 VDC is normal).
7.	Set power selector switch to AUX M/G and use DVM to measure voltage present at power switchboard J3 as in step 2.	
	NOTE Ensure cabling is correctly connected. Turn crypto gear on if connected and place in PLAIN mode for system tests. Refer to figure FO-7 for cabling.	
8.	Set power circuit breakers on equipments as follows:	
	a. HF AM-7148 POWER-RESET/OFF switch to RESET and RT-1444 ON/OFF switch to ON	HF MONITOR/TEST display indicates "8", then "0", (for 5 seconds)."." then blank.
	WARNING During power up of the RT-246, the motor driven tuning knobs may rotate. Keep hands clear during all turn-on and reset procedures. Rapidly rotating knobs can cause injury.	
	b. VHF-FM POWER switch to HIGH (for RT-524) or REMOTE (for RT-246).	

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
	c. SDU set PWR-RESET/OFF switch to RESET.	RSC 1 and 2 are powered up. Indications are as follows for 5 to 10 seconds. HF display: 88.8888, PT, U, L, SQL, and CALL are lit. Times out and indicates last operating frequency, sideband and mode. VHF-FM display: 88, MNL, PT, and CALL are lit. Times out and for RT-246: VHF-FM preset is indicated (CALL may be lit if SQL is set to any OFF position). For RT-524: MNL and - are lit (CALL may be lit if SQL set to any OFF position). STATUS display: FAULT lit and then times out. OPEN CABLE lamp: not lit.
9.	On the UHF/VHF-AM AM-7176's, set the PWR/OFF switch to PWR.	On RSCs, both UHF-AM and VHF-AM displays indicate 888.888, PT,GD, DF, SQL, and CALL are lit. After 5 - 10 seconds, displays return to last operating frequency, and mode selected.
	SQUELCH TESTS **NOTE** For squelch tests, turn individual radio volume controls OFF on RSC, except for radio under test.	
10.	Recall and verify present channels 1,4, and 8 on the UHF-AM and VHF-AM radio subsystems (refer to listings prior to this table, if not already entered).	Preset frequencies are recalled and displayed. UHF-AM / VHF-AM 1 — 229.225 / 119.425 4 — 288.775 / 140.425 8 — 351.050 / 138.050

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
11.	On UHF-AM RT-1319, turn SQL control fully CCW. On RSC-1A select SQL for UGF-AM radio.	RSCs UHF-AM display SQL and CALL indicators are lit.
12.	On UHF-AM AM7176, turn SPKR VOL control to midrange.	Rushing noise heard from speaker.
13.	On UHF-AM RT-1319, SQL control fully CW.	Observe rushing sound ceases and RSCs UHF-AM display CALL indicator goes out in 10 seconds.
14.	On UHF-AM RT-1319, turn SQL control fully CCW, then CW and set to point where noise ceases from speakers. Turn AM-7176 SPKR VOL control to OFF.	SQUELCH control is approximately midrange. RSC UHF-AM display CALL indicator is not lit.
15.	On VHF-AM RT-1319, Turn SQL control fully CCW. on RSC-2A select VHF-AM radio and SQL for VHF-AM radio.	RSCs VHF-AM display SQL and CALL indicators are lit.
16.	On VHF-AM AM-7176, turn SPKR VOL control to midrange.	Rushing noise heard from speaker.
17.	ON VHF-AM RT-1319, turn SQL control fully CW.	Observe rushing sound ceases and RSCs VHF-AM display CALL indicator goes out in 10 seconds.
18.	On VHF-AM RT-1319, turn SQL control fully CCW, then CW and set to point where noise ceases from speakers. Turn AM-7176 SPKR VOL control to OFF.	SQUELCH control is approximately midrange. RSCs VHF-AM display CALL indicator is not lit.
19.	Connect handset to RSC-1A HANDSET connector and monitor HF radio. Turn HF VOL control on RSC 3/4 turn CW.	Rushing sound heard in handset and HF CALL is lit.
20.	On RSC-1A select HF radio and SQL. **NOTE** When SQL indicator is lit on RSCs HF display prior to depressing ENT key, the squelch mode is selected.	RSCs HF display SQL indicator is lit when selected and goes out when ENT key is depressed.

Table 5-8. Performance Test Checks - Continued

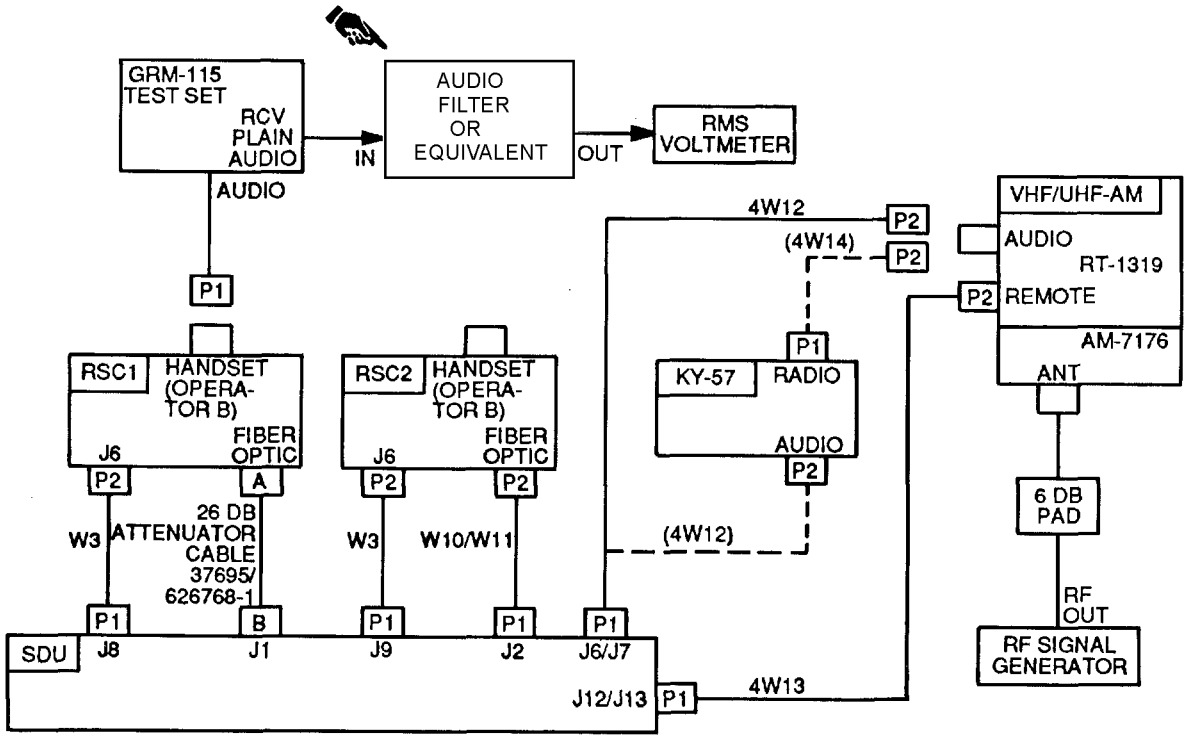
Step	Procedure	Required Indication
21.	On RT-1444, turn SQL/VOL switch CCW to detent (but not OFF), then turn switch 3/4 turn CW.	RSCs HF display CALL indicator is lit.
22.	While observing RSC HF display, turn RT-1444 SQL/VOL switch CW in 1/8 increments pausing 10 seconds after each increment. Leave SQL/VOL switch at point where RSCs HF display CALL indicator goes out.	Level of rushing noise from handset decreases, RSCs HF display CALL indicator is not lit.
23.	On RSC-1A turn HF VOL control fully CCW and turn VHF-FM VOL control 3/4 turn CW.	
24.	On RSC-1A, select VHF-FM. On VHF-FM radio, set SQUELCH control to any OFF position.	Rushing sound is heard in handset and VHF-FM CALL indicator is lit.
25.	On VHF-FM, set SQUELCH switch to NEW-ON position.	Level of rushing sound from handset speaker decreases. RSCs VHF-FM display CALL indicator is not lit.
26.	On VHF-FM, set SQUELCH switch to OLD-ON position.	Level of rushing sound from handset speaker decreases. RSCs VHF-FM display CALL indicator is not lit. If noise does not decrease, check squelch settings on A5000 module of the VHF-FM.
27.	Turn RSC VHF-FM VOL control fully CCW.	
	SYSTEMS ALARM TESTS	
28.	While observing RSC-1 STATUS display, disconnect fiber optic cable from SDU RSC-1 connector. **CAUTION** Prior to resetting SDU, set UHF-AM and VHF-AM AM-7176 PWR-OFF switch to OFF position. This reduces power loading during SDU reset. After SDU reset, turn UHF-AM and VHF-AM radios on and verify RSC display is normal.	STATUS display shows OPEN CABLE and OPEN CABLE lamp comes on. Audible alarm is heard in handset.

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
29.	Set SDU PWR RESET-OFF switch to OFF. Reconnect fiber optic cable to SDU RSC-1 connector, and return SDU PWR RESET-OFF switch to RESET.	STATUS display clears and OPEN CABLE lamp goes out.
30.	Repeat steps 28 and 29 for RSC-2.	
31.	On RSC-1A and RSC-2A positions select VHF-AM. On RSC-1A, enter a frequency of 116.000 MHz, and enter it as preset 2. **CAUTION** Insure that VHF-AM and UHF-AM radios are properly loaded prior to keying transmitters.	
32.	With RSC-2A handset, press PTT key. While RSC-2A is keyed, press PTT key on RSC-1A handset.	Radio busy tone is heard in RSC-1 handset.
33.	Release PTT key of both handsets.	
34.	On RSC-1A, attempt to enter a frequency of 157.000 MHz.	Error tone (eight dits at 1 kHz) is heard in RSC-1 handset and display will not accept frequency entry.
35.	On RSC-1A, press ENT key.	Display returns to last operating frequency.
36.	On RSC-2B, select UHF-AM and attempt to enter a frequency of 225.560 MHz.	Error tone (eight dits at 1 kHz) is heard in RSC-2 handset and display will not accept frequency.
37.	On RSC-2B, press ENT key.	Display returns to last operating frequency.
	BITE TEST	
38.	On UHF-AM AM-7176, set BYPASS-PA switch to BYPASS.	
39.	On RSC-2B, select UHF-AM and while observing RSC-2 STATUS display; key handset on RSC-2B.	STATUS display indicates FAULT and a 2 tone on-off signal (alarm) is heard in handset.

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
40.	Release handset key and set BYPASS-PA switch to PA.	
41.	Press and release handset key; immediately key handset again while observing RSC-2 STATUS display.	Verify RSC STATUS display FAULT indicator is not lit and a 2 tone on-off signal is no longer heard in handset.
42.	Repeat steps 38 through 41 for VHF-AM AM-7176 using RSC-1B.	
43.	Disconnect cable 4W9P3 from BITE connector on AM-7148.	
44.	On RSC-1A. select HF and while observing RSC-1 STATUS display, key handset on RSC-1A.	STATUS display indicates FAULT and a 2 tone on-off signal is heard in handset.
45.	Release handset key and reconnect cable 4W9P3 to BITE connector.	
46.	Press and release handset key: immediately key handset again while observing RSC-1 STATUS display.	Verify RSC STATUS display FAULT indicator is not lit and a 2 tone on-off signal is no longer heard in handset.
	WARNING When RT-246 is removed from REMOTE, the motor driven tuning knobs will rotate to the preset selected by push buttons. Keep hands clear of tuning knobs. These knobs can cause injury.	
47.	On VHF-FM radio. set Power switch to LOW position.	
48.	On RSC-2A, select VHF-FM and while observing RSC-2 STATUS display, key handset on RSC-2A.	STATUS display indicates FAULT and a 2 tone on-off signal is heard in handset.
49.	Release key and set VHF-FM radio POWER switch to HIGH (for RT-524) or REMOTE (for RT-246).	
50.	Press and release handset key; key handset again while observing RSC-2 STATUS display.	STATUS display FAULT indicator is not lit and a 2 tone on-off signal is no longer heard in handset.



NOTES:

1. CONNECT GRM-115 TEST SET, CONNECTOR P1, AS REQUIRED IN TEST PROCEDURES.
2. DASHED LINE SHOWS OPTIONAL SECURE VOICE CONFIGURATION FOR RADIO SYSTEM AN/GRC-206(V)1. SET COMSEC EQUIPMENT (KY-57, IF INSTALLED) FOR PLAIN TEXT MODE OF OPERATION.
3. ALL COAXIAL CABLES ARE RG-58/U.
4. VERIFY AUDIO FILTER LOSS PRIOR TO PERFORMING TEST PROCEDURES.
5. REFER TO FIGURE FO-7 FOR CABLE CONNECTIONS BETWEEN RADIO SYSTEM EQUIPMENT.

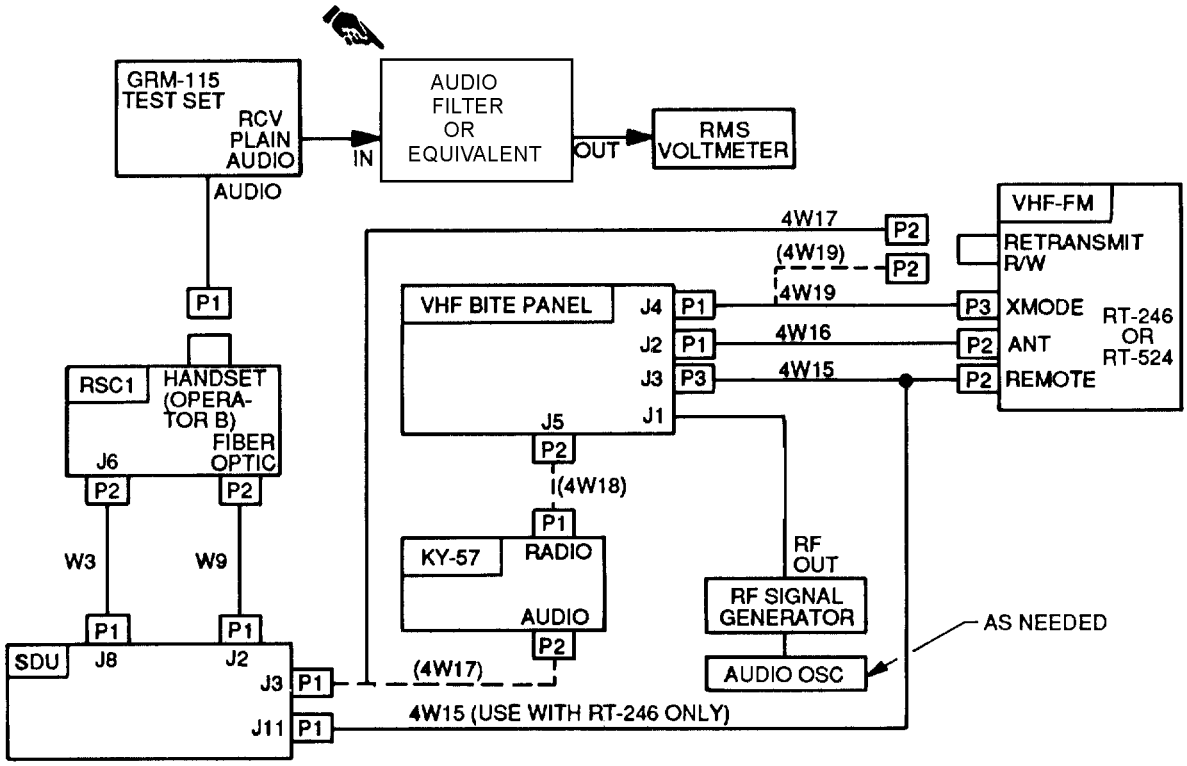
Figure 5-19. Audio Degradation Test Setup Receiver Test, AGC Test, Squelch Sensitivity Test, UHF-AM Guard Receiver Test

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
51.	Deleted	
52.	Deleted	
53.	Deleted	
54.	Deleted	
55.	Deleted	
56.	Deleted	
57.	Deleted	
58.	Deleted	
59.	Deleted	
60.	Deleted	
61.	Deleted	
62.	Connect test equipment as shown in Figure 5-19.	
	VHF/UHF-AM RECEIVE TEST	
63.	Set RF signal generator output level to 3 microvolts at a frequency of 149.975 MHz; 1 kHz modulation at 30% (399.975 MHz).	
64.	Select VHF-AM (UHF-AM) with RSC-1B and enter a frequency of 149.975 MHz (399.975 MHz).	Display shows VHF frequency 149.975 MHz (399.975 MHz).
65.	On RSC set MSTR VOL control to midrange and use VHF-AM (UHF-AM) VOL control for a 0 dB reference on RMS voltmeter. Disable modulation and observe RMS voltmeter.	Voltmeter reading decreases 10 dB or more.
66.	Disconnect GRM-115 from RSC-1B and connect it to RSC-2B. Insure that VHF-AM (UHF-AM) is selected by that position.	
67.	Set RF signal generator to frequency of 138.050 MHz and select P8 as VHF-AM operating frequency (351.050 MHz and select P8 as UHF-AM operation frequency).	RSCs VHF-AM display shows 138.050 MHz, PT, SQL, and CALL. (UHF-AM display shows 351.050 MHz, PT, SQL and CALL.)
68.	Enable modulation on RF signal generator and set for 30% modulation.	Audio level measured on RMS voltmeter.
69.	On RSC set MSTR VOL control to midrange and use VHF-AM (UHF-AM) VOL control to set output audio level for 0 dB reference. Disable modulation and observe RMS voltmeter.	Voltmeter reading decreases 10 dB or more.
	VHF/UHF-AM AGC TEST	
70.	Increase modulation at RF signal generator to 90%. Reset 0 dB reference on RMS voltmeter with VHF-AM (UHF-AM) volume control.	

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
	CAUTION The following test subjeects the main receiver of RT1319 to a very high RF level. Use this high RF level only long enough to make the measurement and then return RF level to 3 microvolts.	
71.	Increase RF signal generator to 500 millivolts.	Audio level remains 0 dB +5, -4 dB.
	VHF/UHF-AM SQUELCH SENSITIVITY TEST	
72.	Reduce RF signal generator output to minimum (maximum attenuation, audio tone must still be heard on the speaker) and adjust SQUELCH on VHF-AM (UHF-AM) RT1319 until audio is squelched. When adjustment of squelch is accomplished, squelch should be adjusted and additional 1/4 should be adjusted an additional 1/4 turn after RT-1319 squelches.	As audio tone squelches, audio level measured by RMS voltmeter decreases not less than 35 dB. CALL goes out in 5-10 seconds after RMS voltmeter indicates squelch.
73.	Set RF signal generator for 30% modulation. Slowly increase RF signal until receiver squelch opens and audio is measured on voltmeter.	Squelch opens at 3 microvolts or less (sharp rise in voltmeter reading).
74.	Slowly decrease RF signal until receiver squelch closes. RSC VHF-AM (UHF-AM) display CALL indicator goes out.	Squelch closes (sharp decline in voltmeter reading) within 2 to 8 dB of point squelch opened. RSC VHF-AM (UHF-AM) display CALL indicator goes out.
75.	Set RF signal generator output to 25 microvolts and rotate VHF-AM (UHF-AM) squelch control fully CW and then fully CCW.	Rotation of squelch control has no effect on audio output and RSC VHF-AM (UHF-AM) display CALL indicator remains lit.
76.	Reduce RF signal generator to level at which squelch operated and reset SQUELCH control	Squelch opens at 3 microvolts or less.
	GUARD RECEIVER TEST	
	NOTE Disable normal squelch before performing VHF-AM GUARD RECEIVE TEST.	
77.	From RSC-1A. select GD	Display indicates 138.050 MHz, PT, SQL, and GD (351.050 MHz, PT, SQL, and GD).
78.	Tune RF signal generator to 243.000 MHz. Set output level to 3 microvolts at 1 kHz, 30%.	Audio measured by RMS voltmeter.
79.	Set RSC-1A MSTR VOL control to midrange and adjust VHF-AM (UHF-AM) VOL control for a 0 dB reference.	
80.	Turn modulation off and observe RMS voltmeter.	Voltmeter reading decreases 10 dB or more.



NOTES:

1. CONNECT GRM-115 TEST SET, CONNECTOR P1, AS REQUIRED IN TEST PROCEDURES.
2. DASHED LINE SHOWS OPTIONAL SECURE VOICE CONFIGURATION FOR RADIO SYSTEM AN/GRC-206(V)1. SET COMSEC EQUIPMENT (KY-57, IF INSTALLED) FOR PLAIN TEXT MODE OF OPERATION.
3. ALL COAXIAL CABLES ARE RG-58/U.
4. VERIFY AUDIO FILTER LOSS PRIOR TO PERFORMING TEST PROCEDURES.
5. REFER TO FIGURE FO-7 FOR CABLE CONNECTIONS BETWEEN RADIO SYSTEM EQUIPMENT.

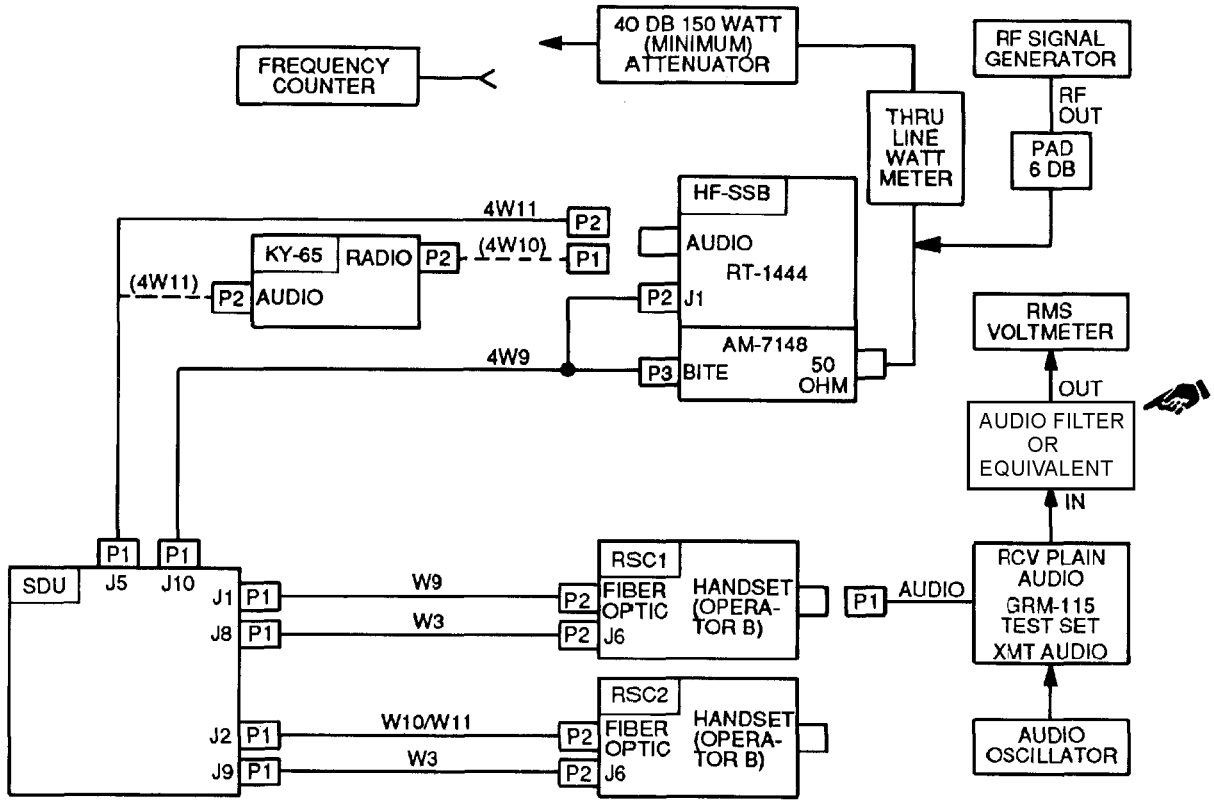
Figure 5-20. Audio Degradation Test Setup Receiver Sensitivity Test, Squelch Sensitivity Test

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
81.	Normalize Radio System Configuration.	
82.	Deleted	
83.	Deleted	
84.	Deleted	
85.	Deleted	
86.	Deleted	
87.	Deleted	
88.	Deleted	
89.	Deleted	
80.	Deleted	
91.	Deleted	
92.	Connect test equipment as show in Figure 5-20.	
	VHF-FM RECEIVER SENSITIVITY	
93.	On VHF-FM radio, set squelch to any OFF position.	
94.	Tune VHF-FM radio to 34.20 MHz or select preset 01 at RSC.	
95.	Set RF signal generator for 34.20 MHz; 0.5 microvolts at 8 kHz deviation.	
96.	Set MSTR VOL control to midrange and adjust VHF-FM VOL control for 0 dB reference on distortion analyzer.	
97.	Remove modulation/deviation at signal generator and observe RMS voltmeter.	Voltmeter reading decreases 10 dB or more.
	VHF-FM SQUELCH SENSITIVITY	
98.	Select internal 1 kHz modulation on RF signal generator and set deviation for 8 kHz.	
99.	Set RF signal generator output level to approximately 0.1 microvolts.	
100.	Set VHF-FM SQUELCH to OLD-ON position. Slowly increase RF signal generator.	RSC VHF-FM display CALL is displayed at about 1 microvolt.
101.	Set VHF-FM SQUELCH to any OFF position and return RF signal generator output to approximately 0.1 microvolts.	
102.	Connect audio oscillator with 150 Hz to external modulation input connector of RF signal generator. Set RF signal generator for external modulation and adjust audio level until 3 kHz of deviation is set on RF signal generator.	
103.	Set VHF-FM SQUELCH to NEW-ON position and slowly increase RF signal generator.	RSC VHF-FM display CALL is displayed at about 1 microvolt.

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
	NOTE Selection of preset channels for VHF-FM may be accomplished from either RSC and any operator position. Correspondingly move test equipments to accommodate new positions.	
104.	Substitute preset or frequencies and repeat steps 99, through 103.	
105.	Normalize Radio System Configuration.	
106.	Deleted	
107.	Deleted	
108.	Deleted	
109.	Deleted	
110.	Deleted	
111.	Deleted	
112.	Deleted	
113.	Deleted	
114.	Deleted	
115.	Deleted	
116.	Deleted	
117.	Deleted	
118.	Deleted	
119.	Connect test equipment as shown in Figure 5-21. Turn RT-1444 volume ON/OFF switch to ON position. HF-SSB RECEIVE TEST **NOTE** Frequencies 18.8888 and 27.7777 are BCD complements of each other and exercise all circuits. This demonstrates the ability of RSC, SDU, and RT-1444 remote adapter to code 280, 000 possible frequencies.	
120.	From RSC-2B, select HF and enter a frequency of 27.7777 MHz, USB, SQL. Connect GRM-115 to RSC-2B handset connector.	
121.	Set MSTR and HF VOL controls on RSC to midrange. Insure SQL/VOL control on RT-4444 is 3/4 turn CW.	
122.	Connect RMS voltmeter through an audio filter to RX PL AUDIO connector of GRM-115.	
123.	Set RF signal generator to 27.7787 MHz and minimum (maximum, attenuation) output. Connect RF signal generator through a 6 dB pad to the 50 ohm connector of AM-7148.	HF receiver remains squelched and minimal reading on RMS voltmeter.



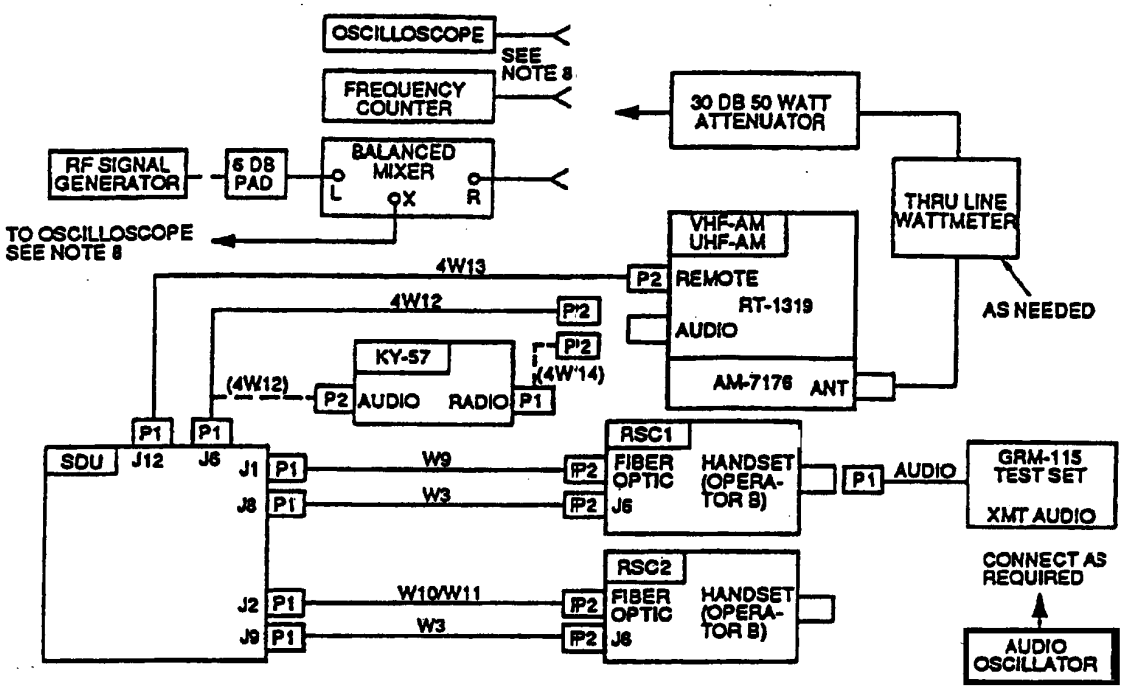
NOTES:

1. CONNECT GRM-115 TEST SET, CONNECTOR P1, AS REQUIRED IN TEST PROCEDURES.
2. CONNECT TEST EQUIPMENT AND ATTENUATOR AS REQUIRED IN TEST PROCEDURES.
3. DASHED LINE SHOWS OPTIONAL SECURE VOICE CONFIGURATION FOR RADIO SYSTEM AN/GRC-206(V)1. SET COMSEC EQUIPMENT (KY-65, IF INSTALLED) FOR PLAIN TEXT MODE OF OPERATION.
4. VERIFY AUDIO FILTER LOSS PRIOR TO PERFORMING RECEIVE TEST PROCEDURES.
5. REFER TO FIGURE FO-7 FOR RADIO SYSTEM CABLING DIAGRAM.

Table 5-21. HF Radio Set Test Setup

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
124.	Slowly increase output level of RF signal generator.	When generator reaches 1.5 microvolts, squelch opens. Voltmeter increases more than 35 dB. CALL shows on HF display.
125.	Turn off RF signal generator output and wait for CALL indicator to go out on RSC HF display.	
126.	Turn RF signal generator output on and increase RF signal generator output to 7 microvolts.	
127.	Vary HF VOL and MSTR VOL control from minimum to maximum.	Voltmeter readings vary from +7 dBm to -45 dBm.
128.	For receiver sensitivity tests, use RSC indicated to set frequencies and sidebands. Set signal generator to minimum output and slowly increase to point squelch opens. Repeat steps 118 through 122. for the following frequencies: RSC — HF-SSB FREQ — SIG GEN FREQ 1A — 3.0000 MHz (U) — 3.0010 MHz 7.0000 MHz (L) — 6.9990 MHz 1B — 11.0000 MHz (U) — 11.0010 MHz 2A — 17.0000 MHz (L) — 16.9990 MHz 21.0000 MHz (U) — 21.0010 MHz 2B — 29.0000 MHz (L) — 28.9990 MHz	Squelch opens and audio tone of 1.5 microvolts or less measured for all frequencies. HF display indicates CALL when squelch opens.
129.	Normalize Radio System Configuration.	
	VHF/UHF-AM TRANSMIT TESTS	
130.	Connect test equipment as shown in Figure 5-22 and connect oscilloscope through a 30 dB attenuator to VHF-AM (UHF-AM) AM-7176, ANT connector. **NOTE** When conducting tests for UHF-AM, use frequencies and information enclosed in parentheses. Otherwise repeat steps.	



TRANSMIT TEST SETUP

NOTES:

1. CONNECT GRM-115 TEST SET. CONNECTOR P1 AS REQUIRED IN TEST PROCEDURES.

2. CONNECT TEST EQUIPMENT AND ATTENUATOR AS REQUIRED IN TEST PROCEDURES.

3. DASHED LINE SHOWS OPTIONAL SECURE VOICE CONFIGURATION FOR RADIO SYSTEM AN/GRC-206(V)1, SET COMSEC EQUIPMENT (KY-57 IF INSTALLED)FOR PLAIN TEXT MODE OF OPERATION.

4. USE FREQUENCY COUNTER TO VERIFY AUDIO OSCILLATOR OUTPUT AS REQUIRED IN TEST PROCEDURES.

5. VERIFY AUDIO FILTER LOSS PRIOR TO PERFORMING RECEIVE TEST.

6. SUBSTITUTE 26 DB ATTENUATOR CABLE (37695/626768-1) FOR W10/W11 WHEN PERFORMING TEST. THIS WILL TEST THE RECEIVE AND TRANSMIT CAPABILITIES OF THE SDU AND RSC FIBER OPTIC MODULES UNDER MINIMUM AND MAXIMUM SIGNAL CONDITIONS.

7. REFER TO FIGURE F0-7 FOR RADIO SYSTEM CABLING DIAGRAM.

8. MIXING NOT REQUIRED FOR DISPLAY ON ALL OSCILLOSCOPES. IF MIXING IS REQUIRED, THE RF SIGNAL GENERATOR (MIXING SOURCE) SHOULD BE APPROXIMATELY 3 MEGAHERTZ ABOVE THE BHF OPERATING FREQUENCY. EXAMPLE: VHF FREQUENCY IS 134.025 MHz, SET SIGNAL GENERATOR FOR UNMODULATED SIGNAL OF 137.025 MHz AT 0.5Vrms.

9. A THRULINE WATTTMETER MAY BE USED IN LIEU OF THE 436A POWER METER. IF USING A THRULINE, THE POWER LEVEL INDICATED WILL BE .636 OF THE OUTPUT POWER MEASURED USING A 436A. TO CONVERT TO THE WATT LEVEL READ ON A 436A POWER METER, MULTIPLY THE THRULINE READING BY 1.57. THE 30 ± 7 WATT TOLERANCE READ ON A POWER METER WOULD BE 19.08 ± 4.45 WATTS. THUS ANY POWER LEVEL BETWEEN 14.63 AND 23.53 WATTS IS ACCEPTABLE ON A THRULINE. ALSO CONSIDER THE TOLERANCE OF THE THRULINE WITH ITS ASSOCIATED ELEMENTS.

Figure 5-22. VHF-UHF-AM Radio Set Test Setup

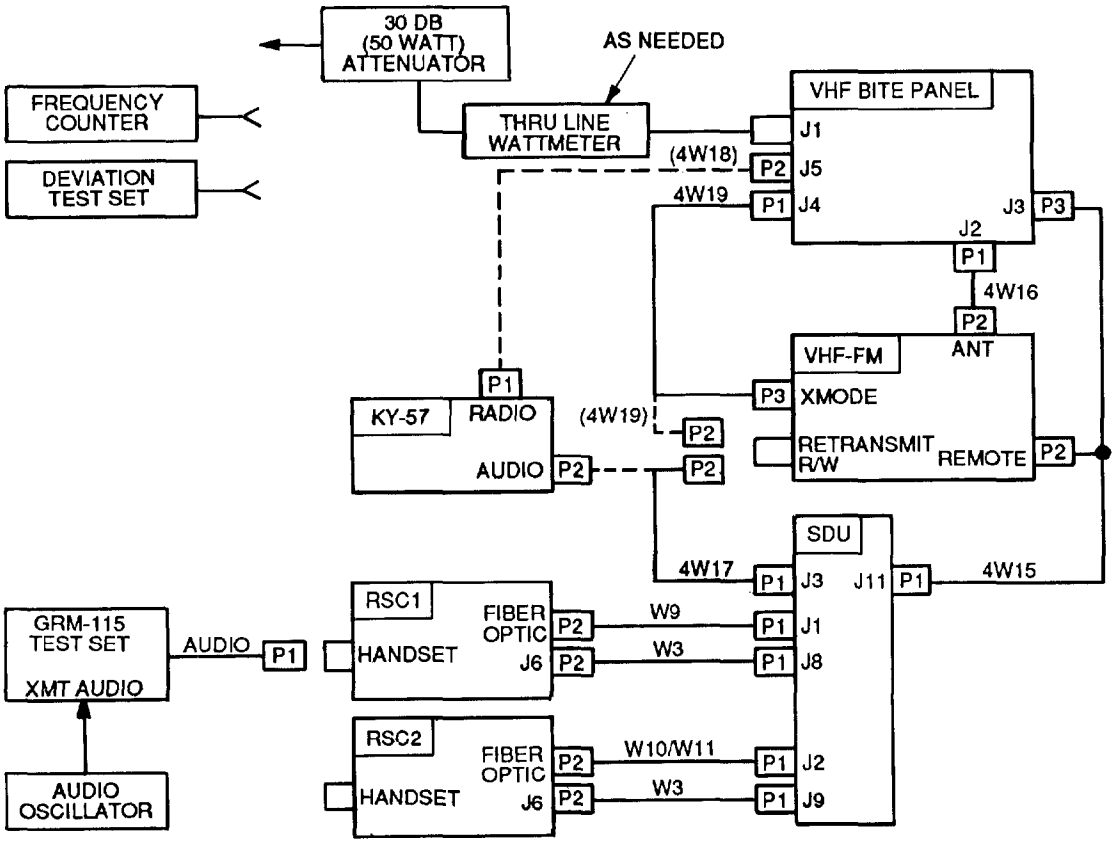
Pages 5-111 through 5-114 have been deleted.

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
131.	Perform steps 132 through 140 using the following frequencies: RSC PRESET — FREQUENCY 1B P8 — 138.050 MHz 1A P1 — 119.425 MHz 2B P4 — 149.975 MHz **NOTE** During tests for percent of modulation, maintain a 2 cm display for unmodulated RF carrier reference.	(351.050 MHz) (229.225 MHz) (288.775 MHz)
132.	On RSC position, select VHF-AM (UHF-AM) preset and press ENT.	RSC VHF-AM (UHF-AM) display shows selected frequency, PT, SQL.
133.	Connect GRM-115 to RSC position handset connector and set PTT switch to TRANSMIT. Observe oscilloscope.	VHF-AM (UHF-AM) is keyed. Unmodulated RF signal displayed on oscilloscope.
134.	Adjust oscilloscope so the display shows unmodulated RF signal at 2 cm peak-to-peak.	
135.	Set GRM-115 PTT switch to RECEIVE and from RSC position select DF tone. Record readings of peak and minimum.	Modulated RF signal shown on oscilloscope (Emax and Emin).
136.	Remove DF tone by pressing DF tone key.	DF goes out on RSC VHF-AM (UHF-AM) display.
137.	Compute percent of modulation. $\frac{Epk - Emin}{Epk + Emin} \times 100 = \%M$	90 +5 -10% modulation negative peak value.
138.	With audio oscillator connected to GRM-115, TRANSMIT AUDIO, adjust output to 1 kHz at an audio level of 0.4 volts.	
139.	Set GRM-115 PTT switch to TRANSMIT and observe waveform on oscilloscope. Record readings and set GRM-115 PTT switch to RECEIVE.	

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
140.	Compute percent of modulation.	87.5 ± 12.5% modulation.
141.	Connect power meter, power sensor and attenuator to VHF-AM (UHF-AM) AM-7176A ANT connector. **NOTE** For correct power measurement the radio must be modulated. Insure audio oscillator is connected to GRM-115 TRANSMIT AUDIO. **NOTE** If using a through-line wattmeter see note 9 on page 5-114.	
142.	Set GRM-115 PTT switch to TRANSMIT and observe Power Meter.	Power meter reads 30 ±7 watts.
143a.	Connect frequency counter and attenuator to VHF-AM (UHF-AM) AM-7176A ANT. connector.	
143b.	Set GRM-115 PTT switch to TRANSMIT and observe frequency counter.	Frequency counter reads transmit frequency ± 150 Hz.
143c	Set GRM-115 PTT switch to RECEIVE.	
	VHF-FM TRANSMIT TESTS	
144.	Connect test equipment as shown in figure 5-23. **WARNING** During selection of presets on RT-246. the motor driven tuning knobs will rotate. Keep hands clear when presets are called. Rapidly rotating knobs can cause injury. **CAUTION** Do not exceed maximum input power rating of power sensor or frequency counter during the following transmit tests. RF power is 35 watts or more. Use attenuators to reduce power level for measurement.	



TRANSMIT TEST SETUP

NOTES:

1. CONNECT GRM-115 TEST SET, CONNECTOR P1, AS REQUIRED IN TEST PROCEDURES.
2. CONNECT TEST EQUIPMENT AS REQUIRED IN TEST PROCEDURES.
3. DASHED LINE SHOWS OPTIONAL SECURE VOICE CONFIGURATION FOR RADIO SYSTEM AN/GRC-206(V)1. SET COMSEC EQUIPMENT (KY-57, IF INSTALLED) FOR PLAIN TEXT MODE OF OPERATION.
4. ALL COAXIAL CABLES ARE RG-58/U.
5. VERIFY AUDIO FILTER LOSS PRIOR TO PERFORMING RECIVE TEST PROCEDURES.
6. REFER TO FIGURE FO-7 FOR CABLE CONNECTIONS BETWEEN RADIO SYSTEM EQUIPMENT.

206(V)1,(V)2-I-46-1
MX-61-020-059-1
BLS103084

Figure 5-23. VHF-FM Radio Test Setup

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
	NOTE For systems using RT-246, a preset is used. Select preset from RSC position indicated. For systems with an RT-524, manually turn the frequencies with the front panel controls. PRESET RSC FREQUENCY P1 1B 34.20 MHz P2 41.00 MHz P3 46.00 MHz P4 47.50 MHz P5 49.80 MHz P6 2B 55.00 MHz P7 60.00 MHz P8 65.00 MHz P9 69.00 MHz P10 72.00 MHz	
145.	Connect GRM-115 to RSC position and select VHF-FM and preset desired.	
146.	Connect wattmeter, frequency counter, and attenuator to VHF BITE panel J1 (AS-1729).	
147.	Perform steps 148 and 149 for each preset listed.	
148.	Set GRM-115 PTT switch to TRANSMIT and observe wattmeter and frequency counter.	Wattmeter 45 +/- 10 watts and frequency counter reads transmit frequency +/- 3 kHz.
149.	Set GRM-115 PTT switch to RECEIVE.	
150.	Connect audio oscillator to GRM-115 TRANSMIT AUDIO. Set audio oscillator to 1 kHz at an output level of 0.4 volts.	
151.	Disconnect frequency counter and connect deviation test set with attenuator to VHF BITE panel J1.	

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
152.	Perform steps 153 through 155 for each preset listed.	
153.	Connect GRM-115 to RSC position and turn VHF-FM radio to frequency or select preset at RSC position.	
154.	Set GRM-115 PTT switch to TRANSMIT	8 +/- 2 kHz deviation
155.	Set GRM-115 PTT switch to RECEIVE.	
156.	Normalize Radio System Configuration.	
	HF-SSB TRANSMIT TESTS	
157.	Connect test equipment as shown in figure 5-21. From RSC-1B monitor HF and select HF SPKR on RSC.	
158.	Enter a frequency of 18.8888 MHz, USB, and SQL.	HF display shows 18.8888, U.
	CAUTION Do not exceed maximum input power rating of frequency counter and power sensor during the following tests. The HF-SSB radio is capable of producing up to 150 watts. Use sufficient power attenuators to protect measurement devices.	
159.	Connect frequency counter with at least 40 dB of attenuation to wattmeter then to 50 ohm connector on AM-7148.	
160.	Connect GRM-115 to RSC-1B. Connect audio oscillator to GRM-115 TRANSMIT AUDIO and set output for 1 kHz at an audio level of 0.4 volts.	
161.	Set GRM-115 PTT switch to TRANSMIT and observe frequency on counter.	18.8898 MHz +/- 100 Hz. Wattmeter reads 150 +10 -50 watts. HF MONITOR/TEST shows 0 (modulated signal).

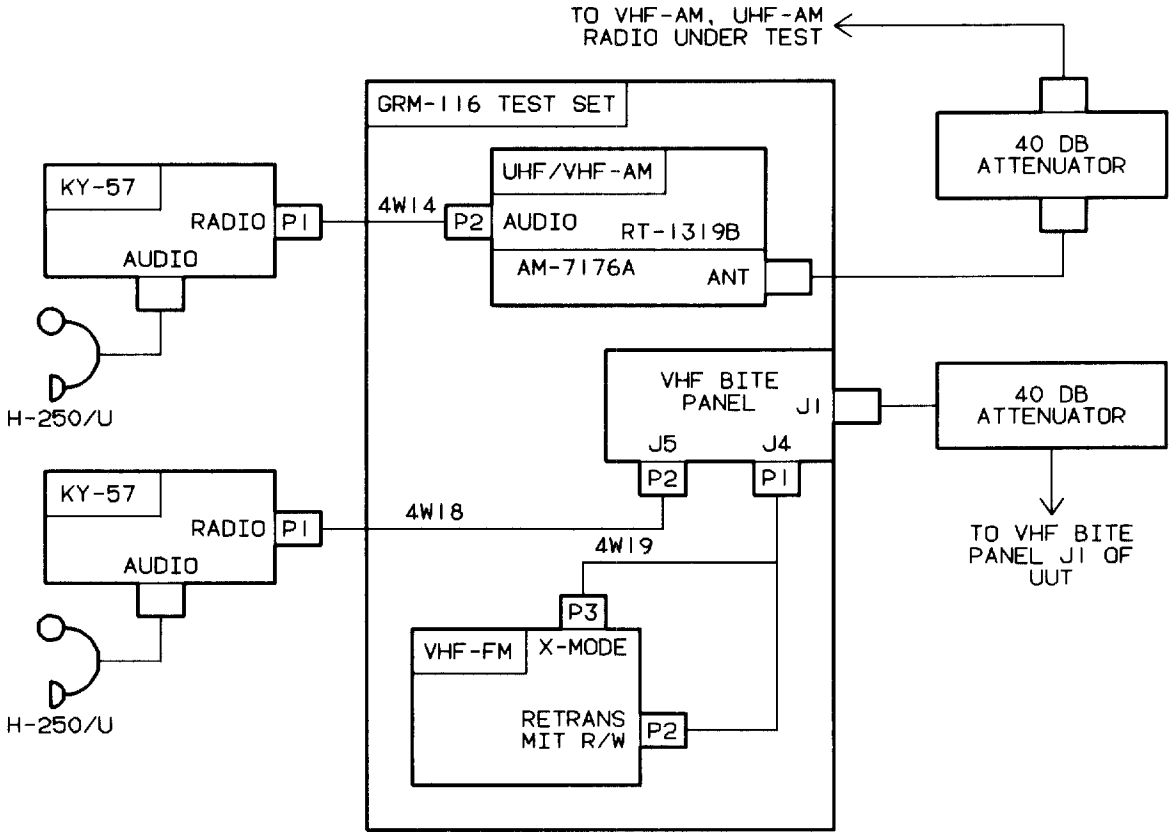
Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required Indication
162.	Set GRM-115 PTT switch to RECEIVE.	
163.	From RSC position indicated, enter the following frequencies and measure frequency accuracy in both upper and lower sidebands. Also measure output power by alternately switching test equipments. Test each frequency as follows:	
	RSC-1A / RSC-2A	
	3.0000 MHz / 17.0000 MHz 7.0000 MHz / 21.0000 MHz 11.0000 MHz / 29.0000 MHz	
	a. Enter frequency and select USB.	RSC HF display shows entered frequency and U.
	b. Set GRM-115 PTT switch to TRANSMIT and observe frequency counter and wattmeter.	Frequency counter reads transmit frequency +/- 100 Hz and wattmeter reads 150 +10 -50 watts.
	c. Set GRM-115 PTT switch to RECEIVE.	
	d. Select LSB.	RSC HF display L indicator is lit.
	e. Set GRM-115 PTT switch to TRANSMIT and observe frequency counter and wattmeter.	Frequency counter reads transmit frequency +/- 100 Hz and wattmeter reads 150 +10 -50 watts.
	f. Set GRM-115 PTT switch to RECEIVE. Proceed to next frequency.	
164.	Normalize Radio System Configuration.	

Pages 5-121 through 5-150 are deleted in their entirety.

Table 5-8. Performance Test Checks - Continued

Step	Procedure	Required indication
	NOTE Do not key all four transmitters for an extended period of time during the following test. Verify all radios have a required antenna or load.	
390.	At RSC-1A select HF, press OPER key, 0/PST key then ENT key.	RSC HF display indicates n tr = 2 .
391.	Press 4 key then ENT key.	RSC HF display indicates last operating condition.
392.	Attach a handset to each RSC and operator positions and select the following: RSC-1A HF-USB 27.7777 RSC-1B VHF-FM 34.20 RSC-2A UHF-AM 399.975 RSC-2B VHF-AM 149.975	
393.	Press the PTT keys as follows: RSC-1A, RSC-1B, RSC-2A, RSC-2B. Unkey all radios.	All radios transmit. PDU CB1 does not trip.
394.	Normalize Radio System configuration.	



NOTES:

1. CONFIGURE GRM-116 TEST SET VHF-AM, UHF-AM OR VHF-FM RADIO SET FOR LOCAL OPERATION (BYPASS RSC-SDU INTERFACE) AS REQUIRED TO PERFORM TEST PROCEDURES.
2. SET COMSEC EQUIPMENT (KY-57) FOR CIPHER TEXT.
3. SET OPERATING FREQUENCIES AND MODES IN ACCORDANCE WITH TEST PROCEDURES.

MX-61-020-061
BLS120984

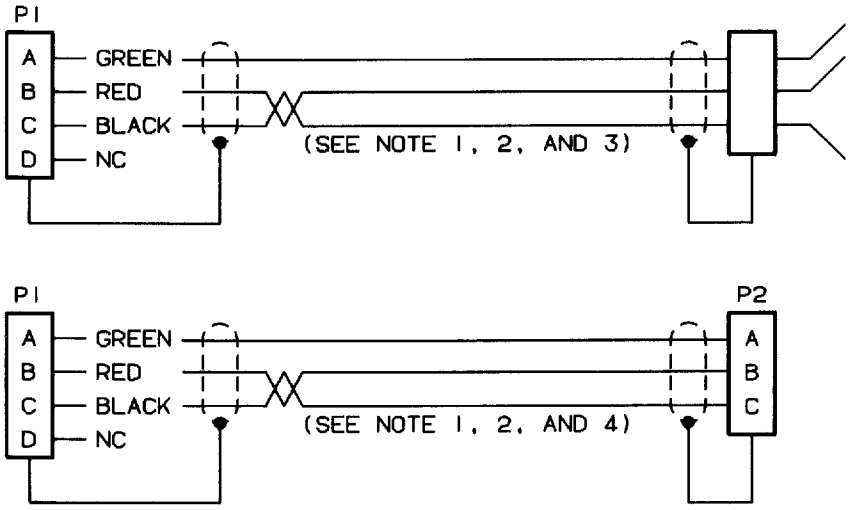
Figure 5-25. Clear/Cipher Indicate Test Setup

CHAPTER 6

CIRCUIT DIAGRAMS

6-1. GENERAL. To assist technicians in understanding functions of the Radio System, circuit diagrams and schematics are integrated within the text pages of chapters 4 and 5. Oversized circuit diagrams and schematics referenced within chapters 4 and 5 are located at the rear of the manual; refer to figures FO-7 through FO-17.

6-2. LOCALLY MANUFACTURED CABLE. A power cable must be constructed to perform maintenance on the HF radio set. Figure 6-1 illustrates the wiring diagram of the required cable. The cable may be constructed to interface with power cable 4W1 of the PJU, or to connect to a separate power source.



1. ALL CONDUCTORS ARE 12 AWG WITH 19/25 STRANDING. THE OVERALL CABLE LENGTH SHOULD BE APPROXIMATELY 10 FEET.
2. CONNECTOR P1, PART NUMBER MW10F(M)A13.
3. USE OF THIS TYPE CABLE WILL REQIUIRE A POWER SOURCE CAPABLE OF SUPPLYING +22.5 TO +30 VOLTS DC.
4. CONNECTOR P2 (OPTIONAL), PART NUMBER MW20M(M)A00. USE OF THIS CONNECTOR (P2) WILL PERMIT THE AM-7148/GRC-206 TO BE POWERED BY THE POWER SWITCHBOARD; SEE FIGURE 5-7.

MX-61-020-062
BLS120984

Figure 6-1. HF Extender Cable Wiring Diagram

CHAPTER 7

ILLUSTRATED PARTS BREAKDOWN
SUBSECTION A
INTRODUCTION

7-1. GENERAL. This Illustrated Parts Breakdown lists, illustrates and describes the parts used in Radio Communication System AN/GRC-206(V)1 and AN/GRC-206(V)2 manufactured by the Magnavox Government and Industrial Electronics Company Fort Wayne, Indiana.

7-2. MAINTENANCE PARTS LIST. The Maintenance Parts List (MPL) (subsection B) consists of the complete Radio Communication System AN/GRC-206(V)1 and AN/GRC-206(V)2 divided into main groups. The main groups are broken down into assemblies, subassemblies and details. Each item is arranged to indicate its relationship to its next higher assembly. Each of the assemblies and subassemblies listed is followed immediately by its component parts. The relationship of the first item of each separately illustrated assembly or subassembly to its next higher assembly is indicated followed by the nomenclature to the first item. In general, the assemblies and parts installed at the time the end item was manufactured are listed and identified in the manual. When an assembly or part (including vendor items), which is different from the original, was installed during the manufacture of later items, series, or blocks, all assemblies and parts are listed (and "Usable on" coded). However, when the original assembly or part does not have continued application (no spares of the original were procured or such spares are no longer authorized for replacement), only the preferred assembly or part is listed. Also, when an assembly or part was installed during modification, and the original does not have continued application, only the preferred item is listed. Interchangeable and substitute assemblies and parts, subsequently authorized by the Government, are not listed in this manual; such items are identified by information available through the Interchangeable and Substitute (I And S) Data Systems. Refer to TO 00-25-184. When a standard size part can be replaced with an oversize or undersize part, the latter parts, showing sizes, are also listed. Repair Parts Kits and Quick Change Units are listed when they are available for replacement.

a. Figure and Index Number Column. This column lists the figure and index number of each part illustrated in the corresponding figure. The index numbers are in numerical sequence and indicate the order of disassembly except where the order of disassembly does not apply. The index numbers identify each part shown in the corresponding figure with the exception of subassemblies and attaching parts which are not illustrated separately. In these cases they are listed, but not indexed. The component parts of the subassemblies are both listed and indexed.

b. Part Number Column. This column lists the contractor's drawing number, including dash numbers, assigned to each part and vendor part numbers of parts used by the contractor exactly as produced by the respective vendor. Those parts which have Government Standards numbers assigned to them have the Government Standards number listed. Parts altered or selected for special fit, tolerance, etc., from vendor, commercial or government standard items have contractor part numbers. The vendor, commercial or Government Standards part number of the altered or selected part, follow the part description in the Description column.

c. FSCM Column. This column list a 5-digit code number denoting the vendor from whom the part may be procured. The source of vendor code numbers is the Federal Supply Code for manufacturers (FSCM) Cataloging Handbook H4-1. A list of applicable vendor code numbers and corresponding vendors follows:

CODE	VENDOR NAMES AND ADDRESSES
03481	BF Goodrich Co. Engineered Products Group 500 S. Main St. Akron, OH 44318
13499	Rockwell Intl Corp. Commercial Electronics Operations and Defense Electronics Operations 400 Collins Rd. N.E. Cedar Rapids, IA 52498
37695	Magnavox Government and Industrial Electronics Company 1313 Production Road Fort Wayne, IN 46808
51163	Flex-Key Corp. 18 Sargent St. Gloucester, MA 01930
58474	The Superior Electric Co. 383 Middle St. Bristol, CT 06010
71286	Rexnord Inc. Speciality Fastner Div. RT. 46 West Hasbrouck Heights, NJ 07604
71468	ITT Cannon Electric 666 E. Dzer Rd. Santa Anna, CA 92702
80058	Joint Electronic Type Designation System
80205	National Aerospace Standards Committee Aerospace Industries Association of America Inc. 1725 DeSales St. NW Washington, DC 20036
81349	Military Specifications Promul- gated by Military Departments/ Agencies Under Authority of Defense Standardization Manual 4120 3-M
81541	Airpax Corp. Cambridge Division, a North American Philips Co. Woods Road P.O. Box 520 Cambridge, MD 21613
81860	Barry Div. of Barry Wright Corp. 700 Pleasant Watertown, MA 02172
95987	Weckesser Co. Inc. 4444 West Irving Park Rd. Chicago, IL 60641
96906	Military Standards Promulgated by Military Departments Under Authority of Defense Standardi- zation Manual 4120 3-M
98230	National Security Agency Fort Meade, MD 20755

d. Description Column. This column contains the description of all items appearing on the Maintenance Parts List. The indentation headed "1" through "7" in this column shows the relationship of parts and subassemblies to assemblies. The description consists of the approved item name as found in the Federal Item Identification Guide for Supply Cataloging Handbook H6-1, or are in accordance with the contractor's drawing title, plus modifiers that are necessary to identify the particular item. Additional information may follow the item description and list of alternate part numbers, as required to give stock ordering information, exceptions to the Usable On Code for the item, references to preceding and subsequent figures concerning assemblies and subassemblies, etc. These data are to be considered an integral part of the item description to assure the correctness of repair and maintenance procedures.

e. Attaching Parts. These are items used to attach parts or assemblies to each other and are listed immediately after the part to be attached. The attaching parts have the same indentation code as the parts attached. The code (AP) appears on the same line with and immediately following the item identified as an attaching part.

f. Units Per Assembly. This column contains the number of units required per assembly and/or subassembly. If more than one assembly is required, the total number of assemblies is listed. When an assembly or subassembly is listed more than once, the total number of units per assembly or subassembly appears the first time and REF appears for subsequent listings.

g. Usable On Code. This column shows the Usable On Codes for systems, assemblies and parts to indicate specific usability by part number. Explanations of the usable on codes are provided at the bottom of the applicable page. The codes A, B, C etc., when shown within a group, relate the part back to the same coded part within the next higher assembly. When this column is left blank, an assembly or part is common to all part number variations of the next higher assembly.

h. Source Code Column. This column contains the source code definitions of applicable source, maintenance, and recoverability (SMR) codes as set forth in TO: 00-25-195.

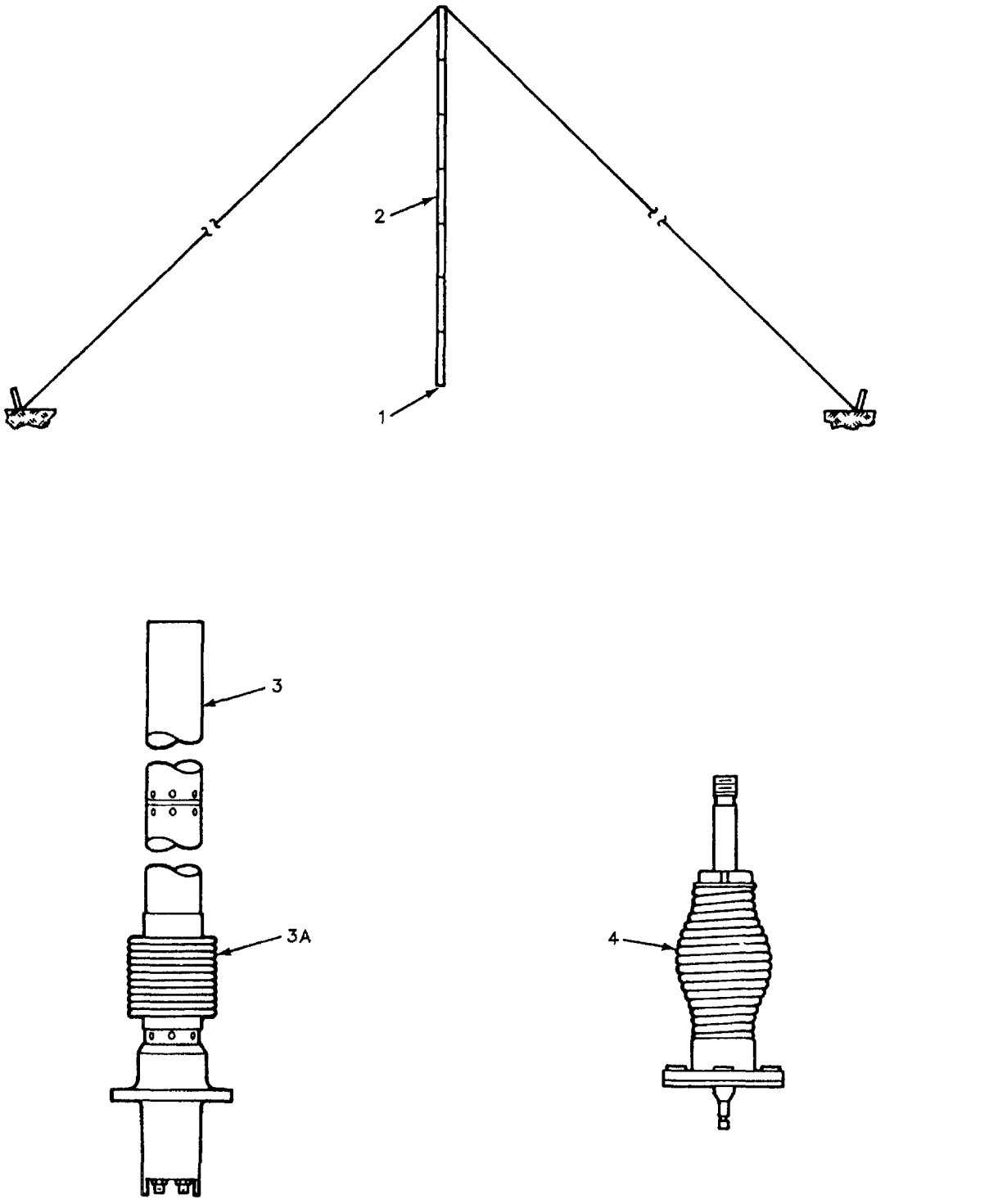


Figure 7-1. Radio Communication System, AN/GRC-206 (V)1 (Sheet 1 of 6)

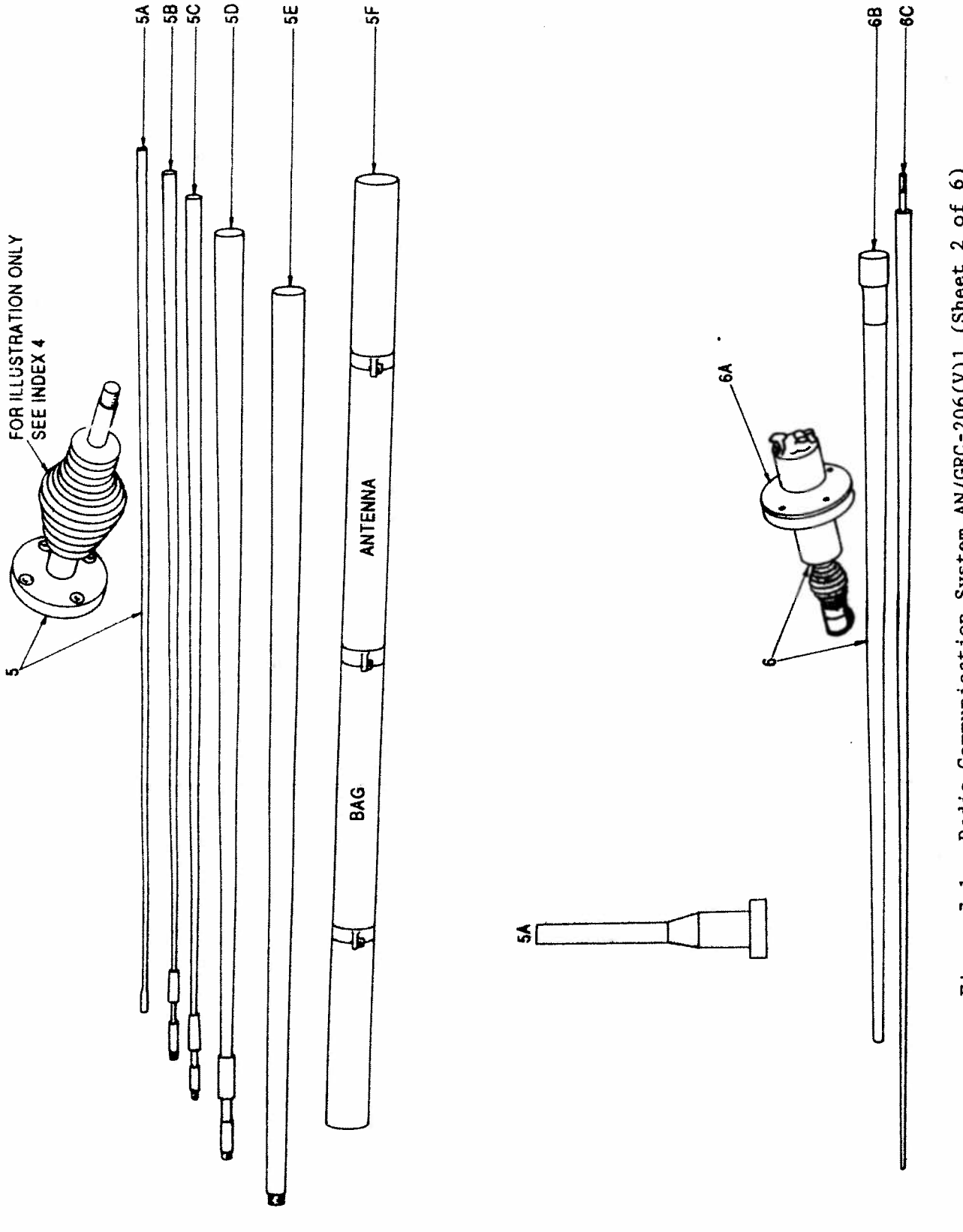


Figure 7-1. Radio Communication System AN/GRC-206(V)1 (Sheet 2 of 6)

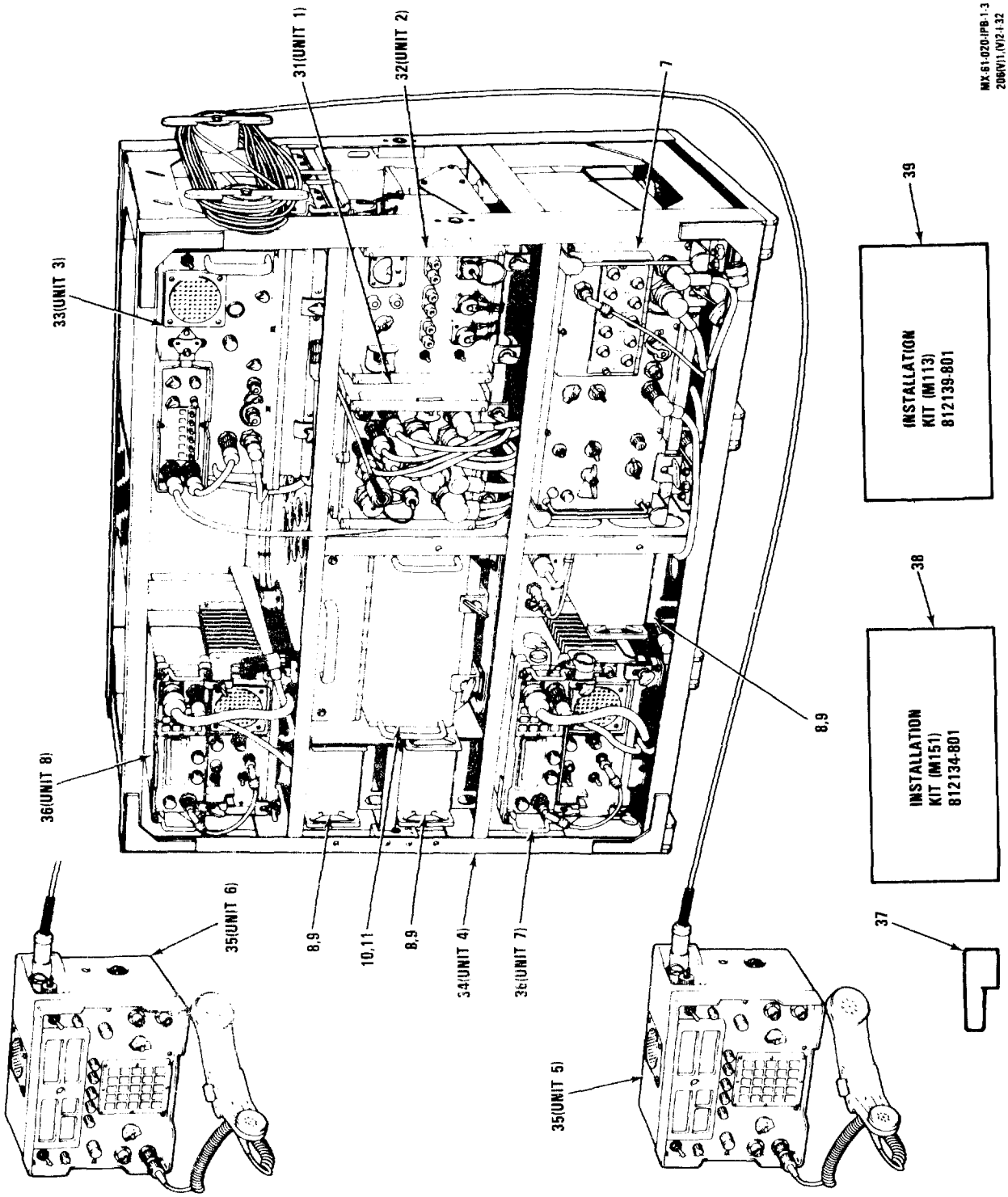


Figure 7-1. Radio Communication System AN/GRC-206(V)1 (Sheet 3 of 6)

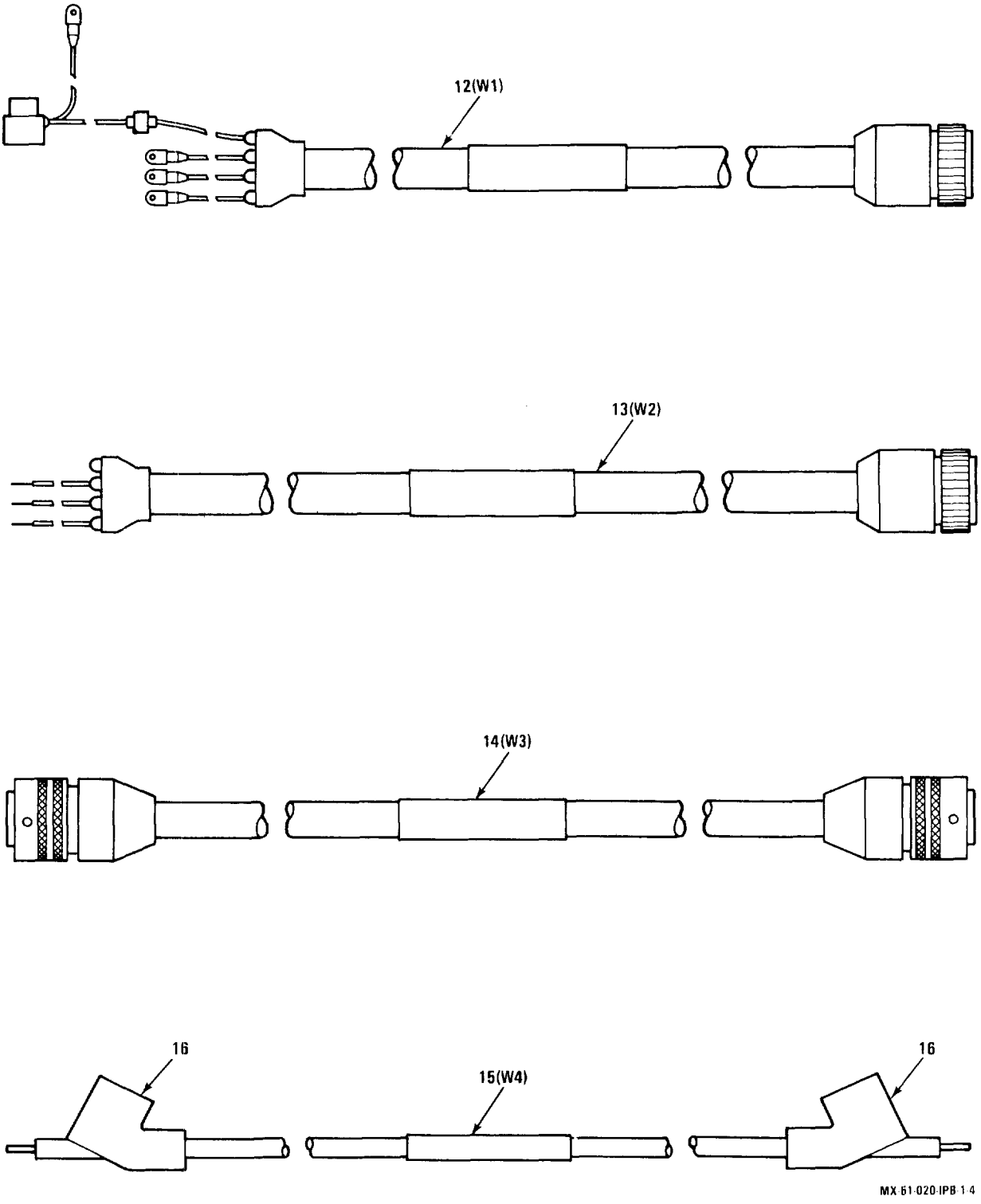


Figure 7-1. Radio Communication System AN/GRC-206(V)1 (Sheet 4 of 6)

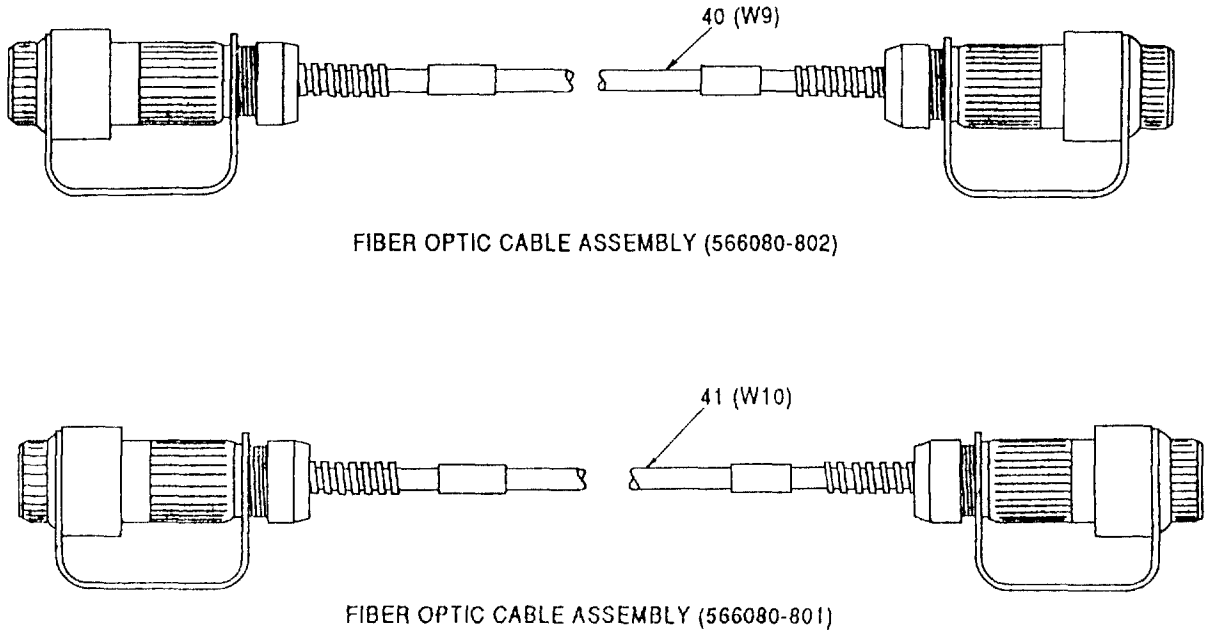


Figure 7-1. Radio Communication System AN/GRC-206(V)1 (Sheet 5 of 6)

CHAPTER 7

SUBSECTION B
MAINTENANCE PARTS LIST

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-1-	707167-801	37695	COMMUNICATION SYSTEM, Radio AN/GRC-206 (V)1	1	A	PAODD
	707167-802	37695	COMMUNICATION SYSTEM, Radio AN/GRC-206(V)2	1	B	PAODD
-1	626500-2	37695	. ADAPTER, Ant.to Ant.Base MX-9313/GR	1		PAOFF
-2	758-5377-001	13499	. HF (NVIS) ANTENNA AS-2259/GR	1		PAOFF
-3	626489-1	37695	. ANTENNA, AS-3588/GRC-206	1		PAOOO
-3A	9604-0204	11556	. . BOOT, Dust & Moist	1		PAOFF
-4	812069-801	37695	. BASE ASSEMBLY, HF antenna	1		PBOZZ
	4245-1	23657	. BASE ASSEMBLY, HF antenna (heavy duty) (Alternate part)			PAOZZ
-5	553-6725-000	13499	. ANTENNA KIT (GFE)	1		XB
-6	AS-1729/VRC	80058	. ANTENNA, VHF/FM (GFE)	1		XB
-7	RT-246/VRC	80058	. RECEIVER-XMTR (Alternate part) (GFE)	1		XB
	RT-524/VRC	80058	. RECEIVER-XMTR (Alternate part) (GFE)	1		PAODD
-8	TSEC/KY-57	98230	. SPEECH SECURITY EQUIPMENT (GFE)	3	A	PAOLD
-9	HYP-57/TSEC	98230	. POWER SUPPLY, Vehicle (GFE)	3	A	XB
-10	TSEC/KY-65	98230	. SPEECH SECURITY EQUIPMENT (GFE)	1	A	PAOLD
-11	Z-AKF/TSEC	98230	. POWER SUPPLY, VEHICLE (GFE)	1	A	XB
-12	566073-801	37695	. CABLE ASSEMBLY, Input power	1		PAOZZ
-13	566073-802	37695	. CABLE ASSEMBLY, Input power	1		PAOZZ
-14	566085-807	37695	. CABLE ASSEMBLY, URSC power	2		PAOZZ
-15	566076-801	37695	. CABLE ASSEMBLY, HF antenna	1		MFF

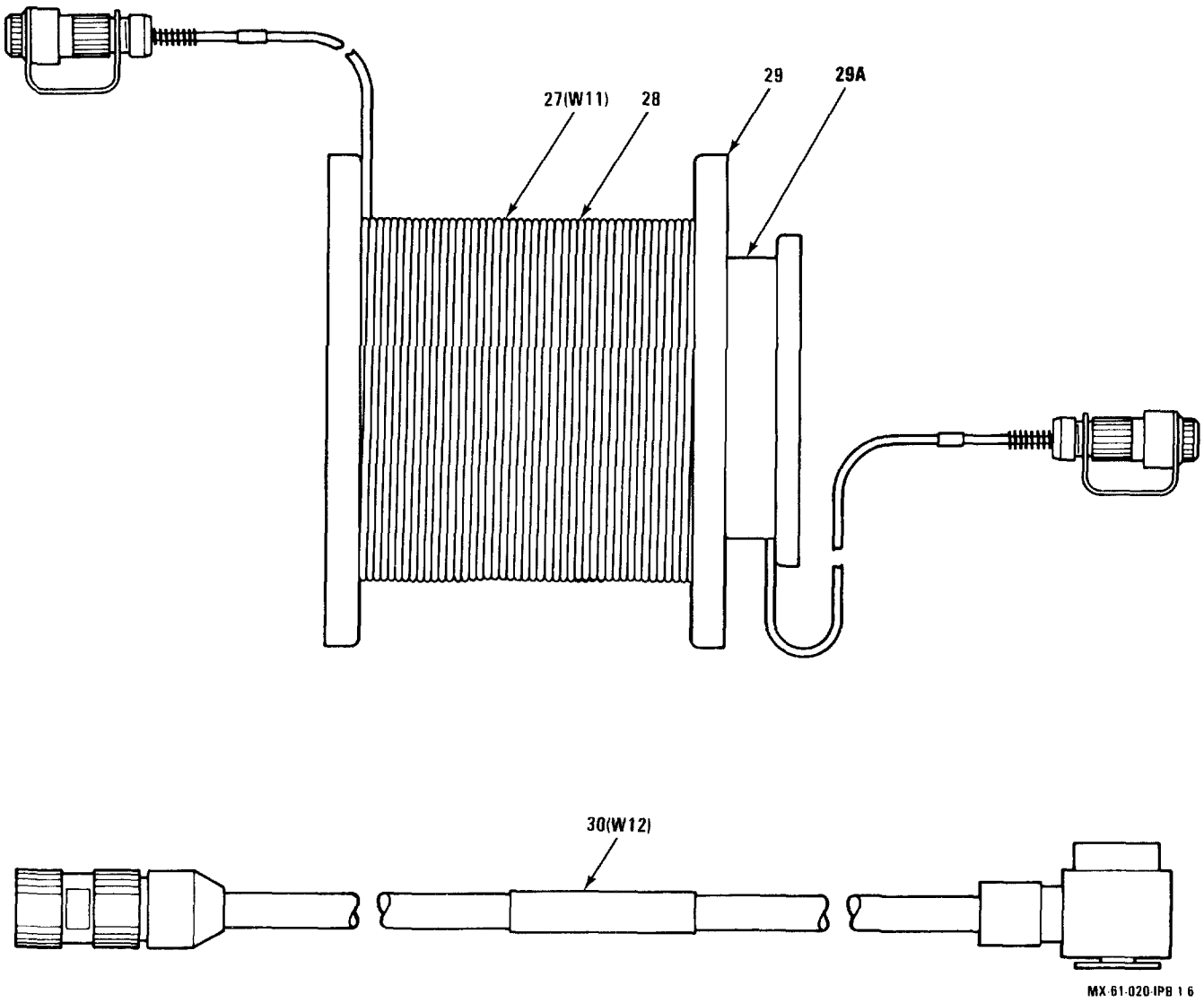


Figure 7-1. Radio Communication System AN/GRC-206(V)1 (Sheet 6 of 6)

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-1-16	348499-1	37695	. . BOOT, Rubber	2		PAFZZ
-17	566077-801	37695	. CABLE ASSEMBLY, VHF/UHF antenna	1		PAFZZ
-18	M39012/01-0005	81349	. . CONNECTOR	1		PAFZZ
-19	M39012/05-0101	81349	. . CONNECTOR	1		PAFZZ
-20	566077-802	37695	. CABLE ASSEMBLY, VHF/UHF antenna	1		PAFZZ
-21	M39012/06-0002	81349	. . CONNECTOR	1		PAFZZ
-22	M39012/05-0101	81349	. . CONNECTOR	1		PAFZZ
-23	566078-801	37695	. CABLE ASSEMBLY VHF/FM antenna	1		PAFZZ
-24	M39012/16-0101	81349	. . CONNECTOR	1		PAFZZ
-25	M39012/20-0101	81349	. . CONNECTOR	1		PAFZZ
-26	566083-80637695	37695	. CABLE ASSEMBLY FM ant control	1		PAOZZ
-27	566081-801	37695	. CABLE ASSEMBLY, Fiber optic, 1 Kilometer	2		PAODD
-28			Deleted			
-29	348494-1	37695	. . REEL, cable	1		PAOZZ
-29A	405018-1	37695	. . . STRAP	1		PAOZZ
-30	566084-807	37695	. CABLE ASSEMBLY, VIC-1 audio	1		PAOZZ
-31	812081-801	37695	. CONTROL SIGNAL DISTRIBUTION UNIT C-11169/GRC-208 (See figure 7-2 for bkdn)	1		PAODD
-32	812082-801	37695	. SWITCHBOARD, Power SB-4151/GRC-206 (See figure 7-3 for bkdn)	1		PAODD
-33	812083-801	37695	. RADIO SET, AN/URC-111 (See figure 7-4 for bkdn)	1		PAODD
-34	812084-801	37695	. RACK, Equipment mounting (See figure 7-5 for bkdn)	1	A	XB
	812084-802	37695	. RACK, Equipment mounting (See figure 7-5 for bkdn)	1	B	XB
-35	812085-801	37695	. CONTROL, Radio set C-11166/GRC-206 (See figure 7-6 for bkdn)	2		PAODD
-36	707123-802	37695	. RADIO SET AN/VRC-83(V)1 (See TO 31R2-2VRC83-2 for bkdn) LESS ITEMS	2		PAODD
	565949-801	37695	CABLE ASSEMBLY input POWER (W1)	1		PAODD
	566084-808	37695	CABLE ASSEMBLY, KY-59 (W3)	1		PAODD
	812097-803	37695	MOUNT	1		PAFLD
	H-250	13499	HANDSET (HS1) (GFE)	1		XB
-37	348657-1	37695	. BOOT INSULATOR	1		PAFZZ
-38	812134-801	37695	. INSTALLATION KIT (M151) (See figure 7-8 for bkdn)	1		XB
-39	812139-801	37695	. INSTALLATION KIT (M113) (See figure 7-7 for bkdn) CLEANING KIT (used with Fiber Optic Module 812099-801)	1		XB
	40-7212	09410	. POLISHING DISC. Cloth (Magnavox spec cont dwg 349185-1)	1		PAOZZ
	N8184	06175	. MAGNIFIER, Pocket (Magnavox spec cont dwg 349188-1)	1		XB
	2200200	89264	. ALCOHOL, isopropyl	1		PAOZZ
-40	566080-802	37695	. CABLE ASSEMBLY, Fiber optic, 20 ft	1		PAODD
-41	566080-801	37695	. CABLE ASSEMBLY, Fiber optic, 50 ft	1		PAODD

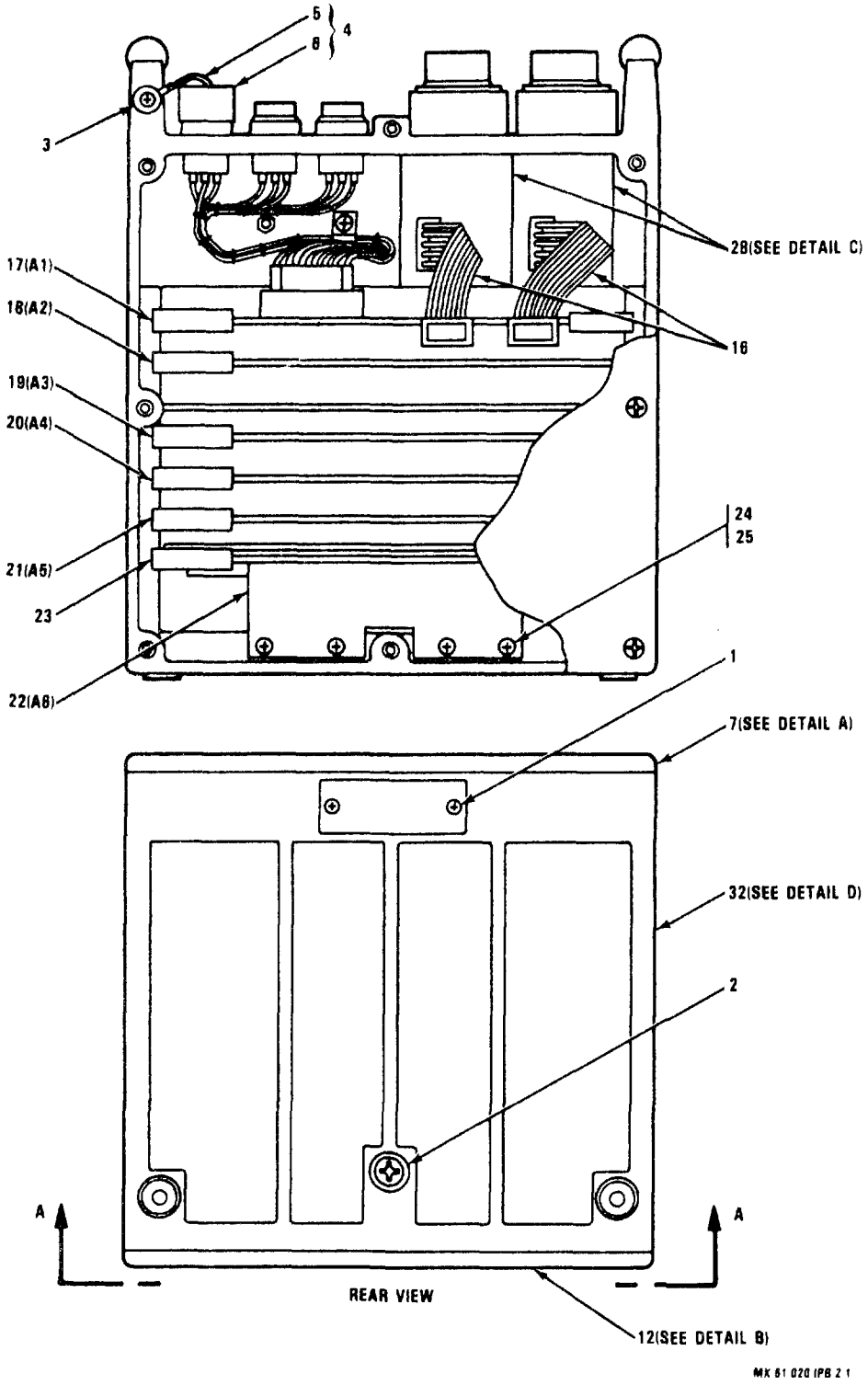


Figure 7-2. Control Signal Distribution Unit C-11169/GRC-206 (Sheet 1 of 5)

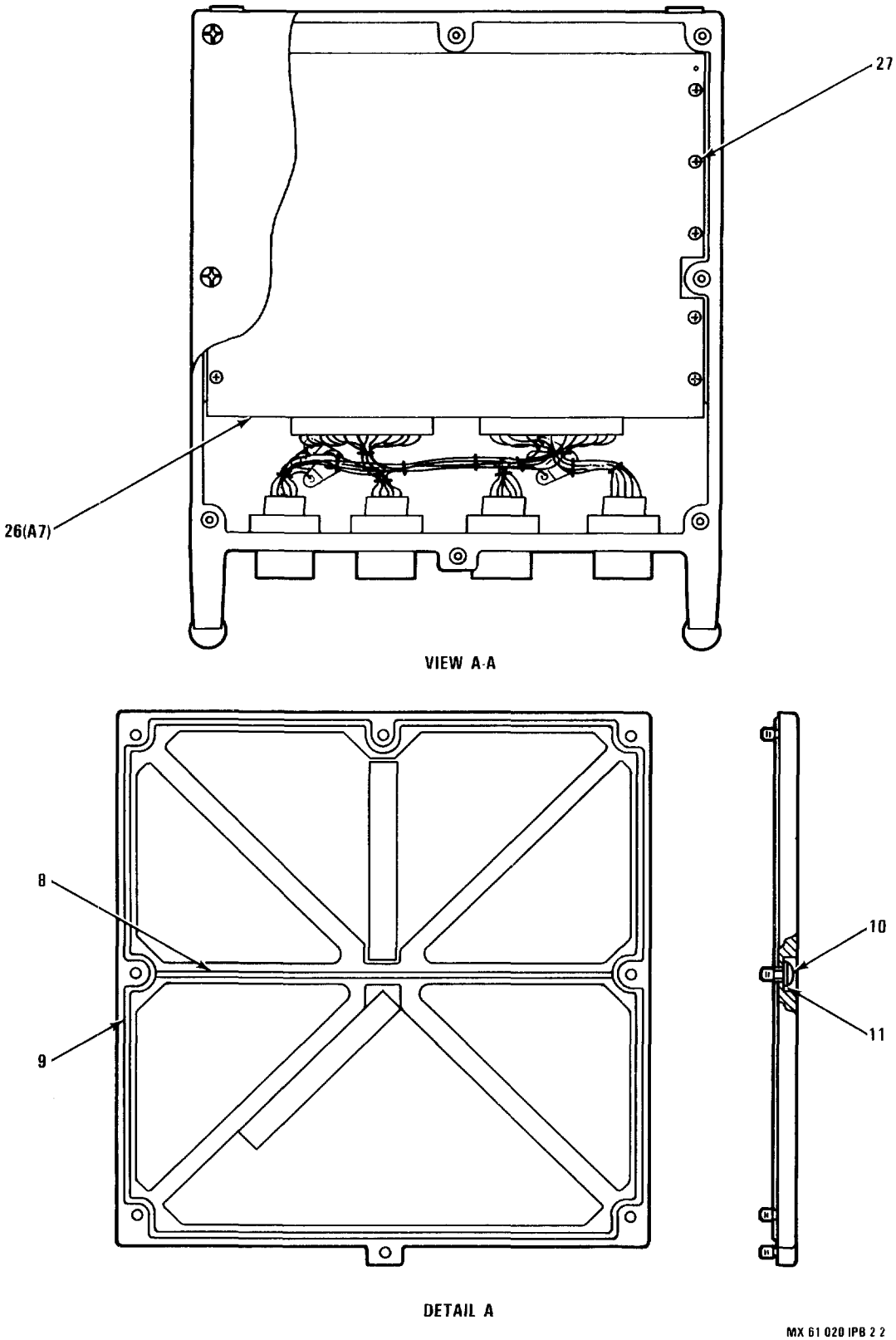
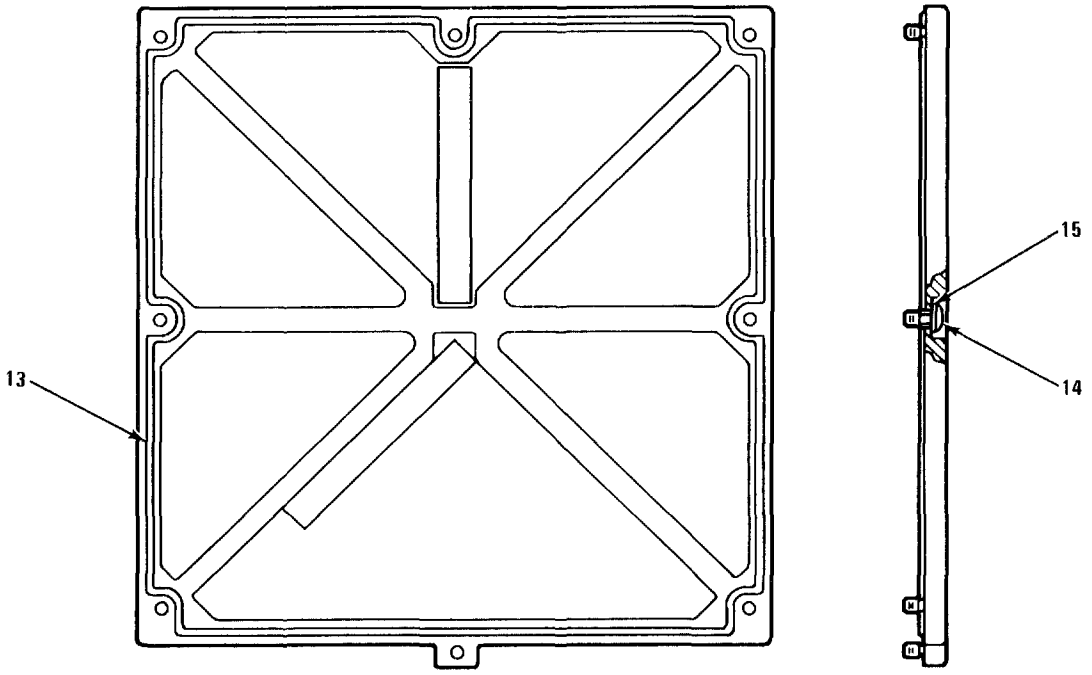
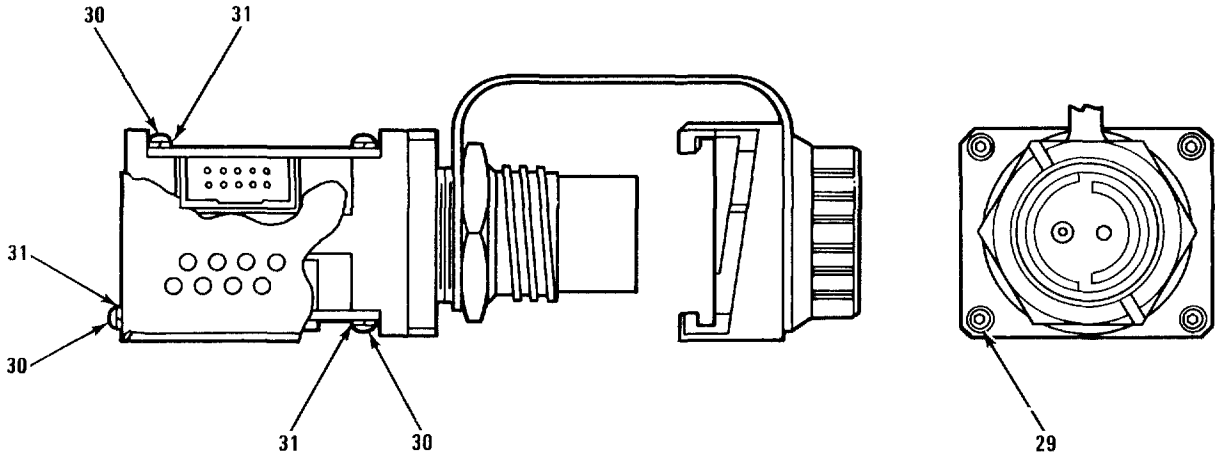


Figure 7-2. Control Signal Distribution Unit C-11169/GRC-206 (Sheet 2 of 5)



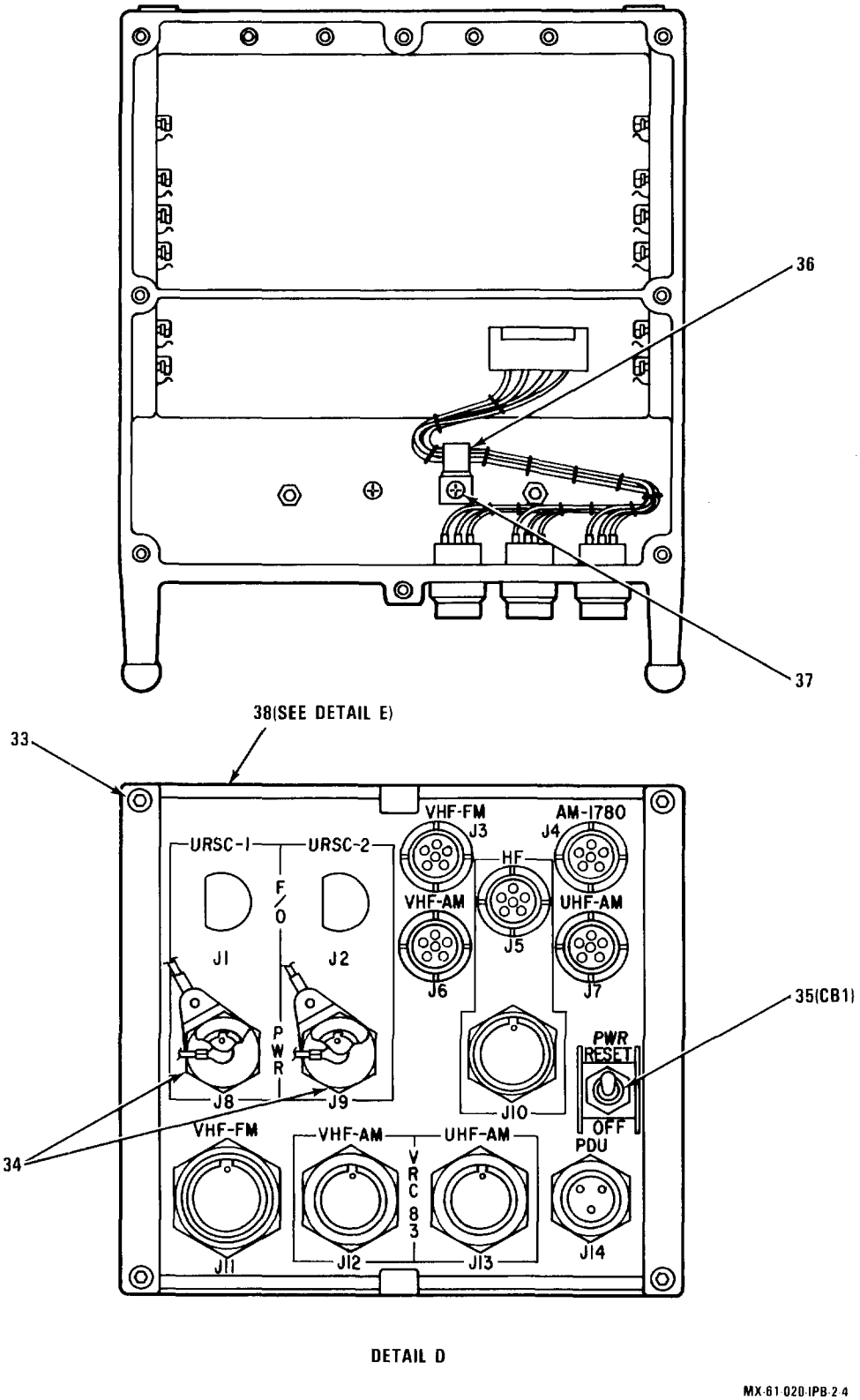
DETAIL B



DETAIL C

MX 81 020 IPB 2 3

Figure 7-2. Control Signal Distribution Unit C-11169/GRC-206 (Sheet 3 of 5)



DETAIL D

MX-61 020-IPB-2 4

Figure 7-2. Control Signal Distribution Unit C-11169/GRC-206 (Sheet 4 of 5)

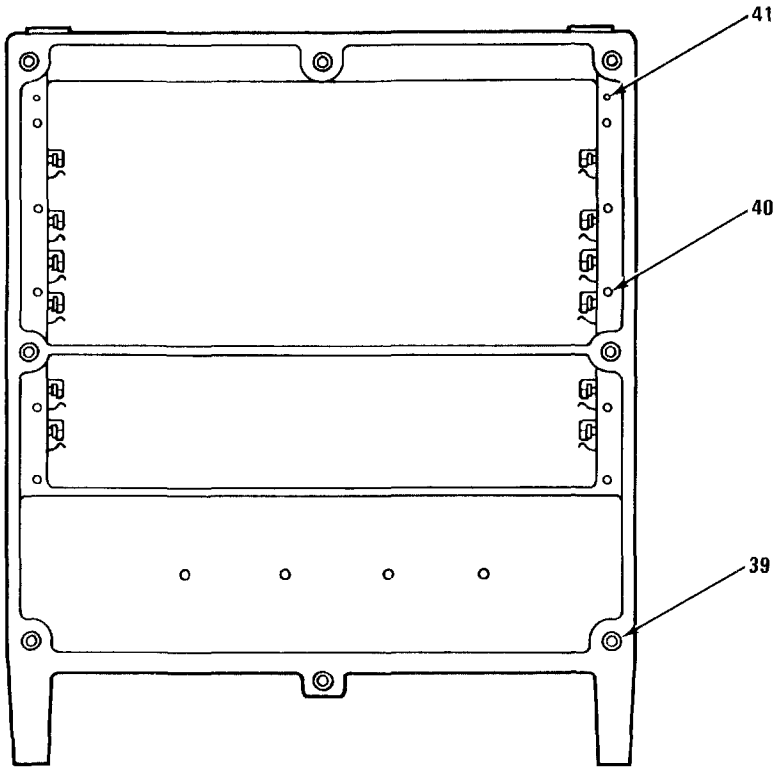


Figure 7-2. Control Signal Distribution Unit C-11169/GRC-206 (Sheet 5 of 5)

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-1-	73	71984	. LENS TISSUE (Magnavox spec cont dwg 447339-3)	400		XB
	8564	71984	. DISPENSER, Sight saver tissue (Magnavox spec cont dwg 447339-4)	1		PAOZZ
	807882-13	37695	. DETERGENT, Liquid	1		XB
-40	566080-801	37695	. CABLE ASSEMBLY, Fiber optic, 50 FT	1		PAOZZ
-41	566080-802	37695	. CABLE ASSEMBLY, Fiber optic, 20 FT A – Used on 707167-801 only B – Used on 707167-802 only	1		PAOZZ
7-2-	812081-801	37695	CONTROL SIGNAL DISTRUBUTION UNIT C-11169/GRC-206 (See figure 7-1 for bkdn)	REF		PAODD
-1	MS51957-11	96906	. SCREW	2		PAFZZ
-2	MS3213-31	96906	. SCREW	1		PAFZZ
-3	514919-1	37695	. RETAINER	1		PAFZZ
-4	8182187-802	37695	. CAP ASSEMBLY, Connector	1		XB
-5	938573-1	37695	. . FERRULE	2		PAOZZ
-6	348205-2	37695	. . CAP, Protective	1		PAOZZ
-7	660152-801	37695	. COVER, Distribution unit	1		XB
-8	348294-4	37695	. . GASKET, Rubber	1		PAFZZ
-9	348294-1	37695	. . Gasket, Rubber	1		PAFZZ
-10	136555-1	37695	. . SCREW, Modified	8		PAFZZ
-11	NAS620C6	80205	. . WASHER	8		PAFZZ
-12	660152-803	37695	. COVER, Distribution unit	1		XB
-13	348294-1	37695	. . GASKET, Rubber	1		PAFZZ
-14	136555-1	37695	. . SCREW, Modified	8		PAFZZ
-15	NAS620C6	80205	. . WASHER	8		PAFZZ
-16	566588-801	37695	. CABLE ASSEMBLY, Fiber optic module	1		PAFZZ
-17	812094-801	37695	. CIRCUIT CARD ASSEMBLY, Audio interface (1)	1		PAFLD
-18	812095-801	37695	. CIRCUIT CARD ASSEMBLY, Audio interface (2)	1		PAFLD
-19	812154-801	37695	. CIRCUIT CARD ASSEMBLY, Red interface	1		PAFLD
-20	812117-801	37695	. CIRCUIT CARD ASSEMBLY, Black interface	1		PAFLD
-21	812116-801	37695	. CIRCUIT CARD ASSEMBLY, CPU	1		PAFLD
-22	812122-801	37695	. CIRCUIT CARD ASSEMBLY, Power supply	1		PAFLD
-23	S-203	18677	. . EJECTOR, Circuit card (Magnavox spec cont dwg 112781-3)	2		PAFZZ
-24	136555-1	37695	. . SCREW, Modified	4		PAFZZ
-25	MS35338-136	96906	. . WASHER	4		PAFZZ

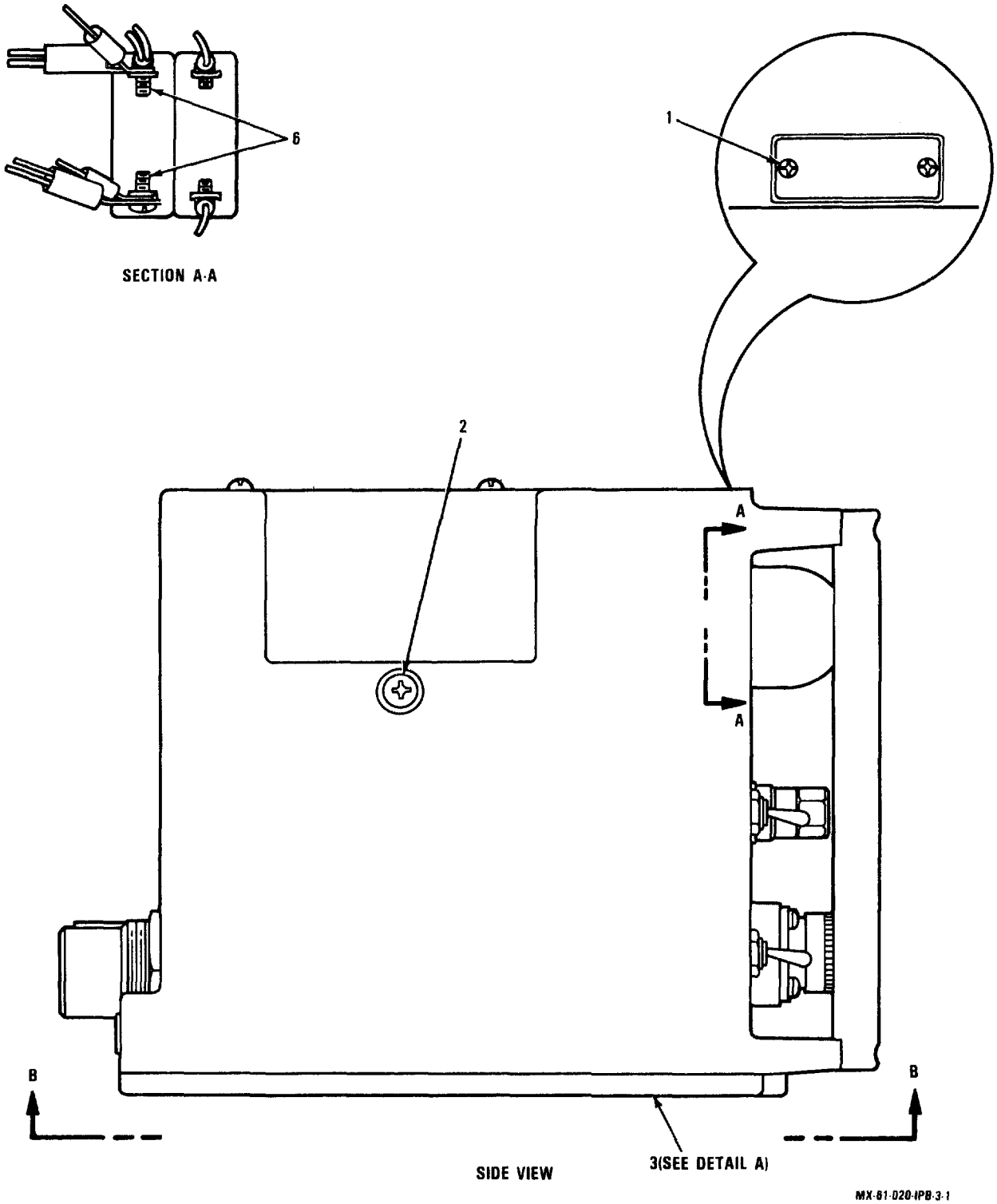
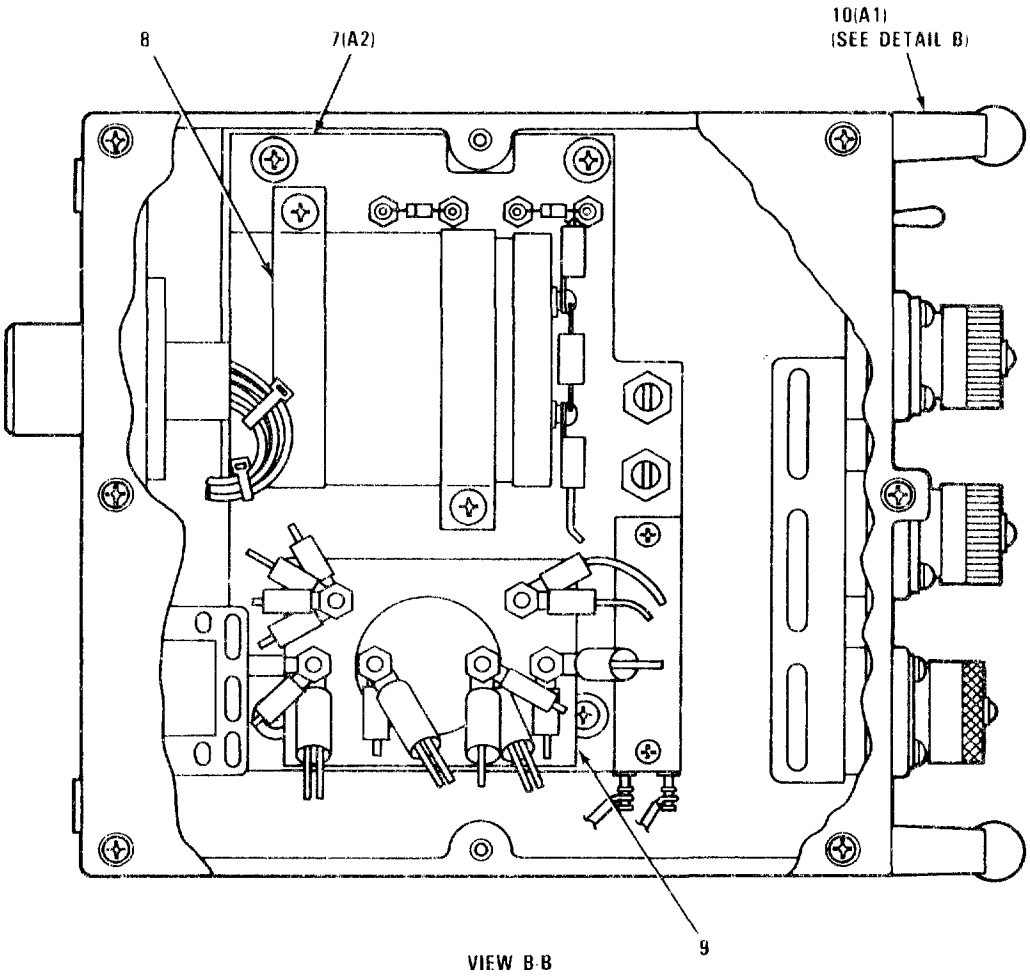


Figure 7-3. Power Switchboard SB-4151/GRC-206 (Sheet 1 of 3)



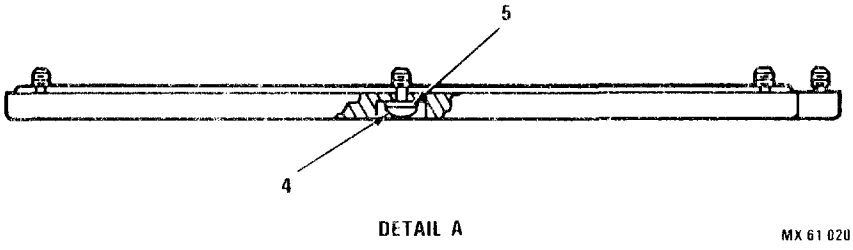
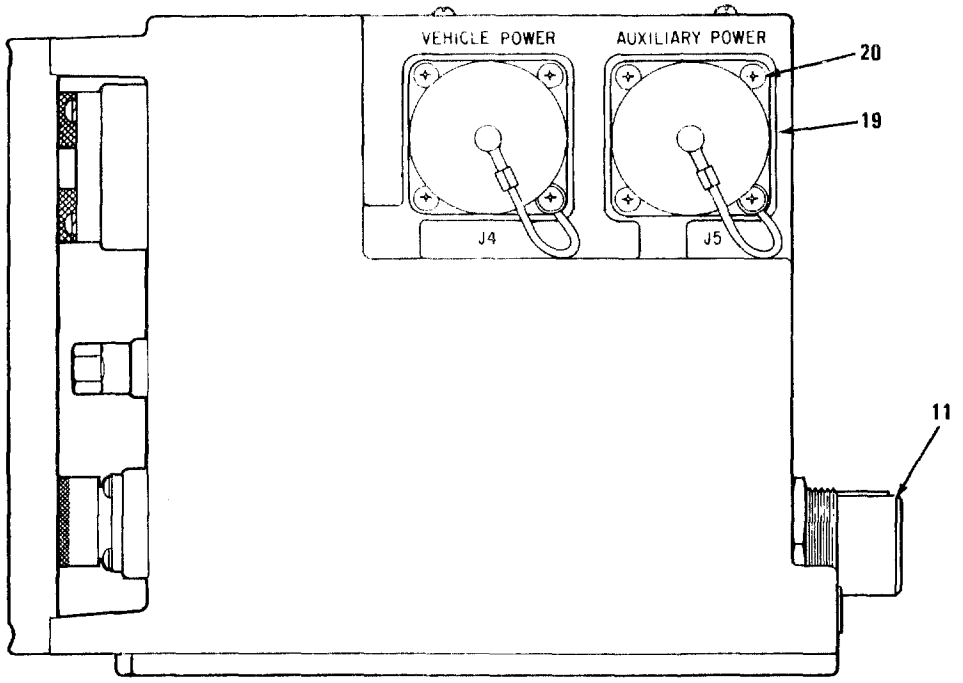
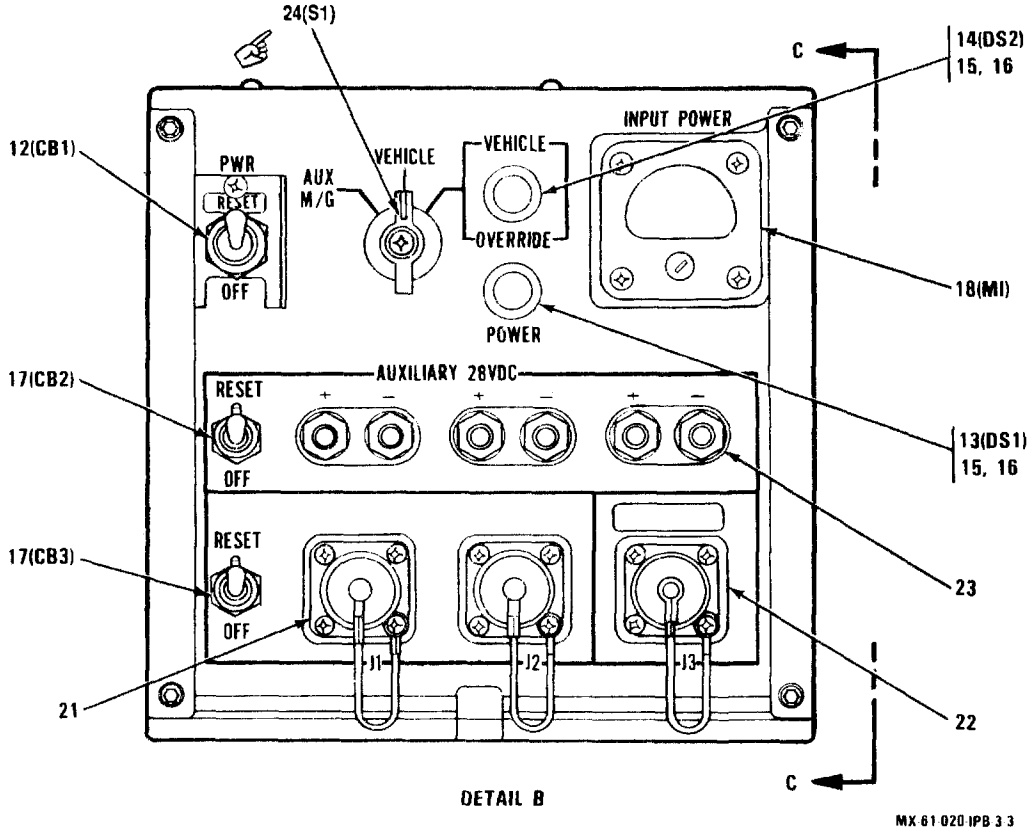


Figure 7-3. Power Switchboard SB-4151/GRC-206 (Sheet 2 of 3)



VIEW C-C



DETAIL B

MX-61-020-IPB-3-3

Figure 7-3. Power Switchboard SB-4151/GRC-206 (Sheet 3 of 3)

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-2-26	812129-801	37695	. CIRCUIT CARD ASSEMBLY, SDU motherboard	1		PAFLD
-27	MS51957-13	96906	. SCREW (AP)	10		PAFZZ
	NAS620C4	80205	. WASHER (AP)	10		PAFZZ
-28	812099-801	96906	. MODULE ASSEMBLY, Fiber optic	1		PAFLD
-29	136652-1	37695	. . SCREW, Cap	4		PAFZZ
-30	MS51957-2	96906	. . SCREW.	12		PAFZZ
-31	MS35338-134	96906	. . WASHER	12		PAFZZ
-32	812086-801	37695	. CASE ASSEMBLY, SDU	1		PAFDD
-33	MS16995-26B	96906	. . SCREW.	4		PAFZZ
-34	MS3181-10R	81349	. . CAP	2		PAFZZ
-35	M39019/01-230	81349	. . CIRCUIT BREAKER.	1		PAFZZ
-36	NAS1397R5B	80205	. . CLAMP	1		PAFZZ
-37	MS51957-15	96906	. . SCREW (AP)	1		PAFZZ
	D4-128CAD PLATE IRID YELLOW	95937	. . WASHER, Saddle (AP) (Magnavox spec cont dwg 109605-1)	1		PAFZZ
-38	660150-801	37695	. . CASE, Signal distribution unit	1		XB
-39	MS122118	96906	. . . INSERT	18		PAFZZ
-40	MS122116	96906	. . . INSERT	10		PAFZZ
-41	MS16562-190	96906	. . . PIN, Spring	2		PAFZZ
7-3-	812082-801	37695	SWITCHBOARD, Power SB-4151/ GRC-206 (See figure 7-1 for bkdn)	REF		PAODD
-1	MS51957-11	96906	. SCREW	2		PAFZZ
-2	MS3213-31	96906	. SCREW	1		PAFZZ
-3	660152-802	37695	. COVER, Distribution unit	1		XB
-4	136555-1	37695	. . SCREW, Modified.	8		PAFZZ
-5	NAS620C6	80205	. . WASHER	8		PAFZZ
-6	MS51958-61	96906	. SCREW	4		PAFZZ
-7	812991-801	37695	. PLATE ASSEMBLY, Mounting	1		XB
-8	MS21333-25	96906	. . CLAMP	2		PAFZZ
	MS51958-61	96906	. . SCREW (AP)	1		PAOZZ
-9	MS24187D2	96906	. . RELAY	1		PAOZZ
	MS51958-62	96906	. . SCREW (AP)	2		PAOZZ
-10	812088-801	37695	. CASE ASSEMBLY, Power distribution unit	1		PAFDD
-11	CA3102E12S	71468	. . CONNECTOR, Plug (Magnavox spec cont dwg 186188-1)	1		PAFZZ
-12	UPGN66-8254-1	81541	. . CIRCUIT BREAKER. (Magnavox spec cont dwg 164431-1)	1		PAFZZ
-13	LC36GD2	81349	. . LAMPHOLDER	1		PAFZZ
-14	LC36YD2	96906	. . LAMPHOLDER	1		PAFZZ

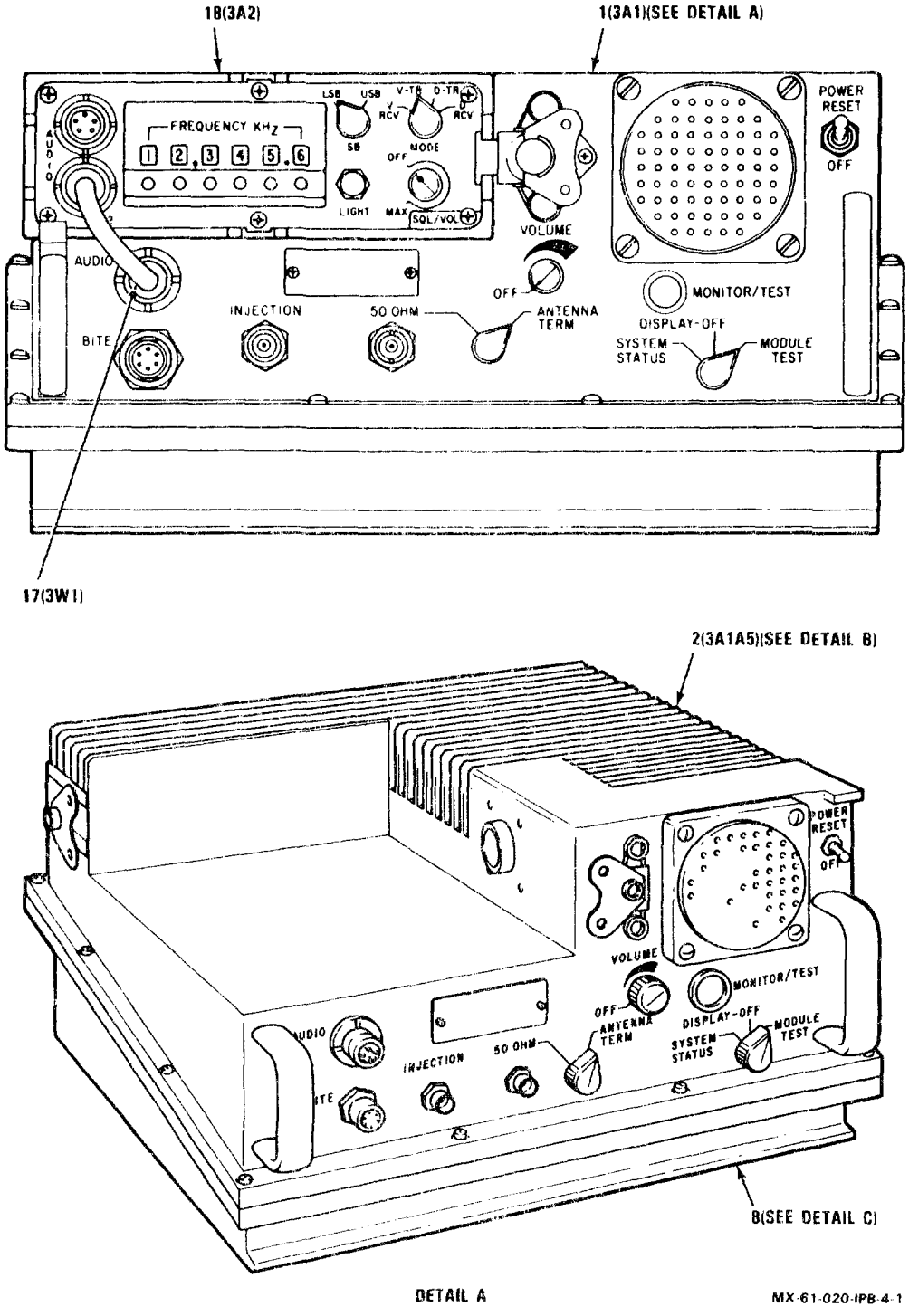


Figure 7-4. Radio Set AN/URC-113 (Sheet 1 of 5)

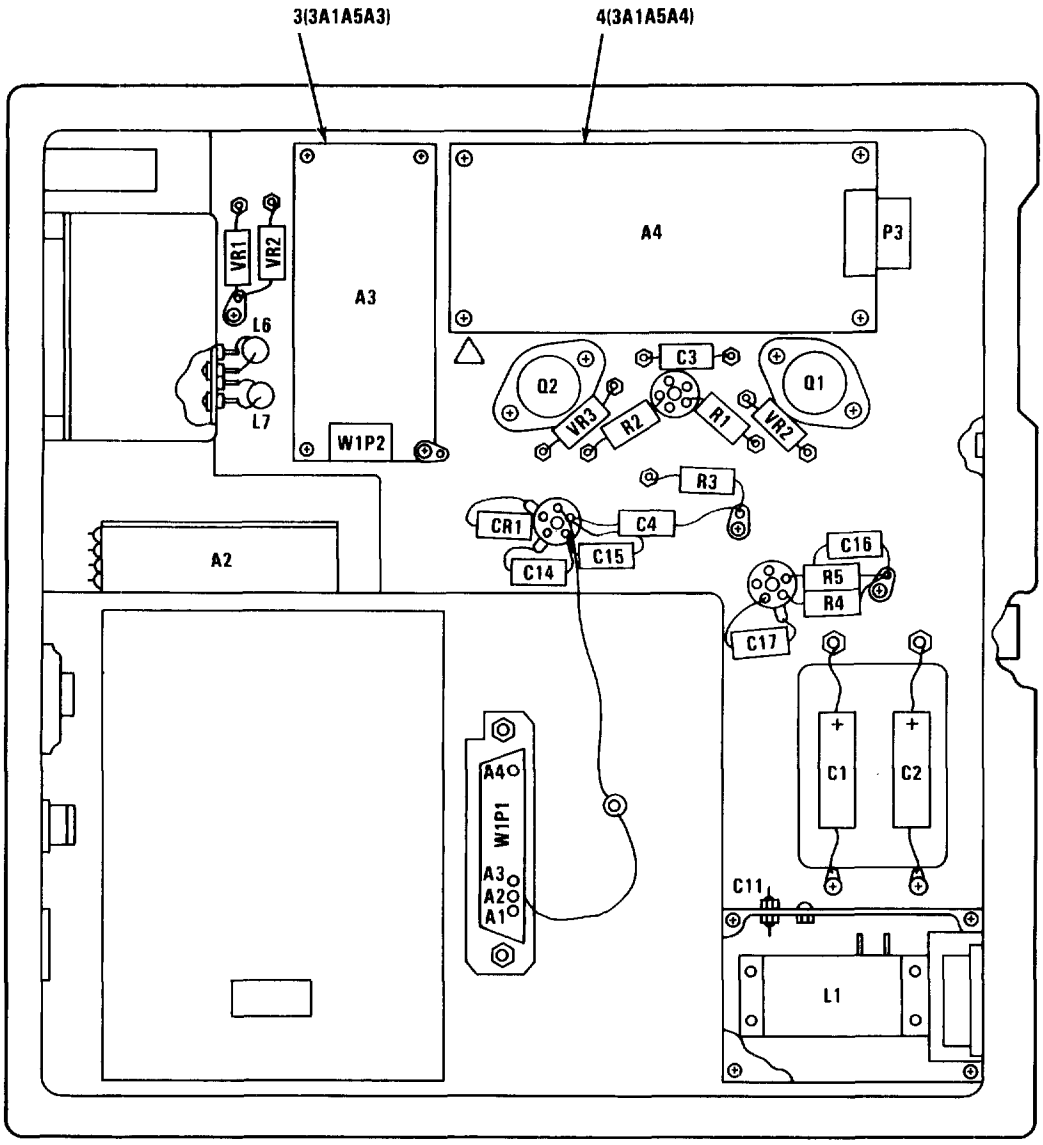


Figure 7-4. Radio Set AN/URC-113 (Sheet 2 of 5)

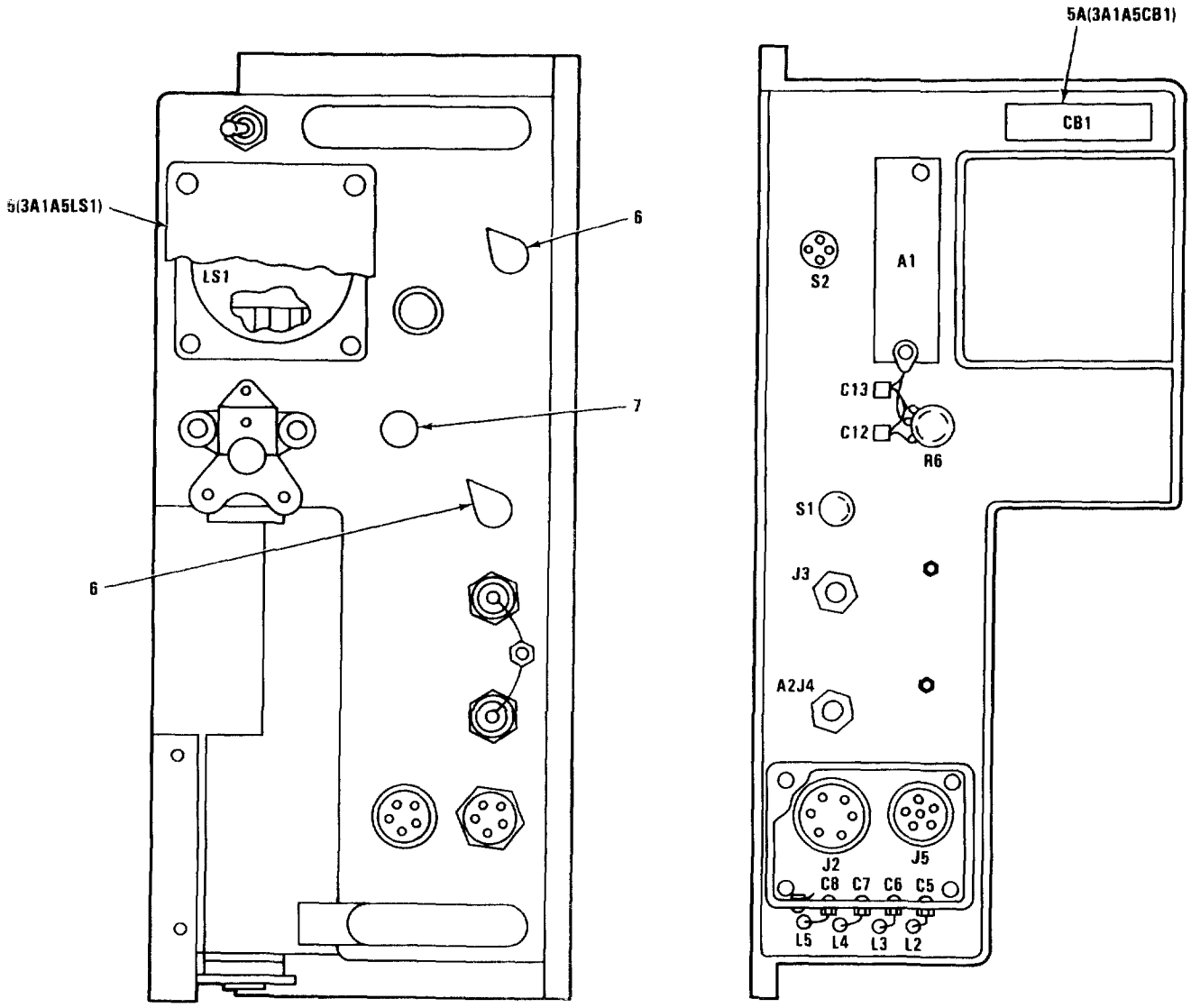
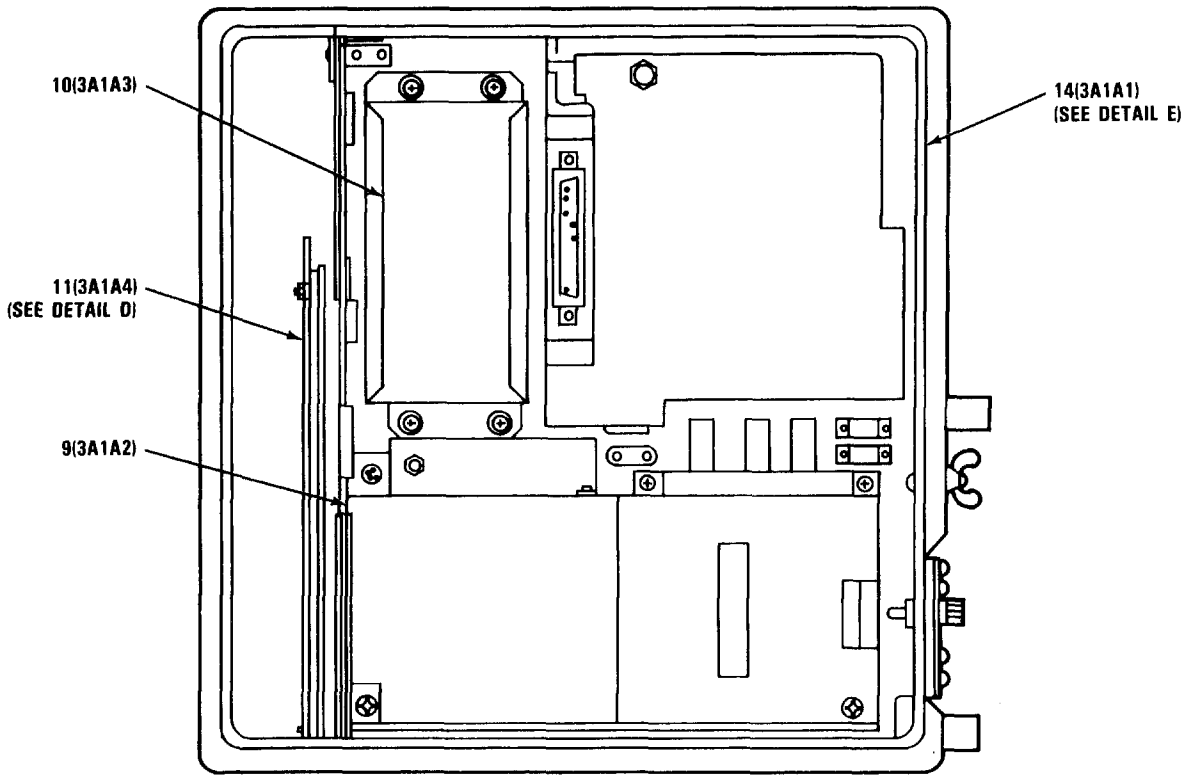
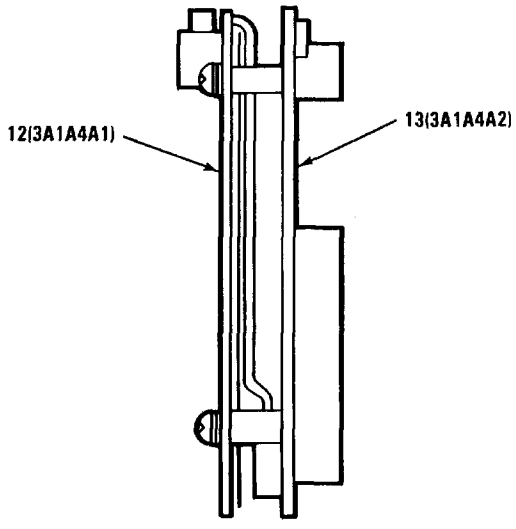


Figure 7-4. Radio Set AN/URC-113 (Sheet 3 of 5)



DETAIL C



DETAIL D

MX-61-020-IPB-4-4

Figure 7-4. Radio Set AN/URC-113 (Sheet 4 of 5)

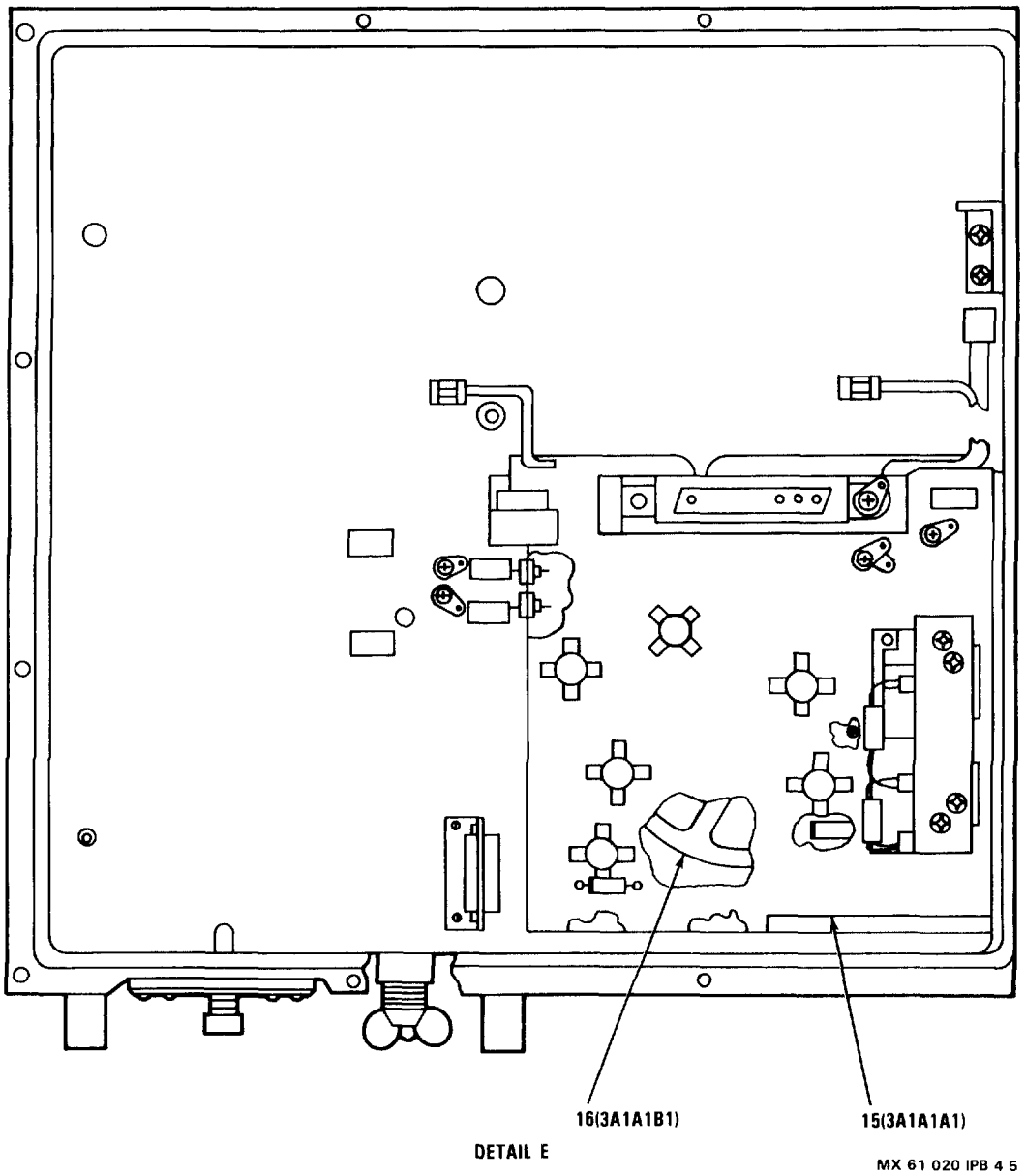


Figure 7-4. Radio Set AN/URC-113 (Sheet 5 of 5)

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-3-15	MS25237-387	96906	. . LAMP	2		PAOZZ
-16	LH89/1	81349	. . HOUSING	2		PAFZZ
-17	M39019/01-248	81349	. . CIRCUIT BREAKER	2		PAFZZ
-18	MR13W050DCVVR	81349	. . METER	1		PAFZZ
	MS51957-18B	96906	. . SCREW (AP)	4		PAFZZ
-19	CA3102E24-22PB	71468	. . CONNECTOR, Bayonet coupling (Magnavox spec cont dwg 186359-1)	2		PAFZZ
-20	MS51957-29B	96906	. . SCREW (AP)	4		PAFZZ
	MS35338-136	96906	. . WASHER (AP)	4		PAFZZ
-21	CA3102E12S-3SB	71468	. . CONNECTOR, Bayonet coupling (Magnavox spec cont dwg 186358-1)	2		PAFZZ
	MS51957-15B	96906	. . SCREW (AP)	4		PAFZZ
-22	MS3112E12-3S	96906	. . CONNECTOR	1		PAFZZ
-23	BP30-2-BR	58474	. . POST, Binding el (Magnavox spec cont dwg 186180-1)	3		PAFZZ
-24	165436	37695	. . SWITCH, Rotary	1		PAOZZ
	MS91525-1		. . . KNOB	1		PAFZZ
7-4 -	812083-801	37695	RADIO SET, AN/URC-113 (HF/SSB unit) (See figure 7-1 for nha)	REF		PAODD
-1	626701-1	37695	. AMPLIFIER-COUPLER AM-7148/GRC-206	1		PAODD
-2	651-8445-001	13499	. . ⛑CHASSIS, Electrical equipment, upper	1		PAFDD
-3	646-5619-001	13499	. . . ⛑AUDIO AMPLIFIER	1		PAFLD
	P330-1021-000	77250	. . . SCREW, Machine (AP) 330-1021-000	5		PAFZZ
	MS35338-135	96906	. . . WASHER (AP) 310-0279-000	5		PAFZZ
	MS15795-803	96906	. . . WASHER (AP) 310-0779-030	5		PAFZZ
	MS0035431-1	96906	. . . TERMINAL, Lug (AP) 304-1645-010	1		PAFZZ
	541-5977-002	13499	. . . SPACER, Sleeve (AP)	5		PAFZZ
-4	646-5831-001	13499	. . . CONTROL, Power conditioner (EFF to rev ltr T)	1		PAFLD

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE	SMR CODE
	P330-1679-020	77250	. . . SCREW, Ext rlv body (AP) 330-1679-020	4		PAFZZ
	MS35338-136	96906	. . . WASHER, Lock (AP) 310-0282-000	4		PAFZZ
	MS15795-805	96906	. . . WASHER, Flat (AP) 310-0779-050	4		PAFZZ
	541-6019-002	13499	. . . SPACER, Sleeve (AP)	4		PAFZZ
-5	M12606-1	81349	. . . LOUDSPEAKER 271-0268-010	1		PAFZZ
-5A	M39019-01-258	81349	. . . CIRCUIT BREAKER	1		PAFZZ
-6	MS91528-0P1B	96906	. . . KNOB 281-0323-000	2		PAFZZ
-7	777-0614-001	13499	. . . KNOB	1		PAFZZ
	MS51963-9	96906	. . . SET SCREW (AP) 328-5020-000	1		PAFZZ
-8	659-5791-001	13499	. . AMPLIFIER-COUPLER ASSEMBLY	1		PAODD
-9	642-1859-001	13499	. . . TUNER ASSEMBLY, Antenna	1		PAFLD
-10	651-8464-001	13499	. . . FILTER ASSEMBLY, Low pass	1		PAFLD
-11	651-8463-001	13499	. . . LOGIC ASSEMBLY, Control	1		PAFLD
	MS51957-34	96906	. . . SCREW, Machine (AP) 343-0176-000	2		PAFZZ
	MS51957-31	96906	. . . SCREW, Machine (AP) 343-0173-000	1		PAFZZ
	MS35338-136	96906	. . . WASHER, Lock (AP) 310-0282-000	2		PAFZZ
	MS15795-805	96906	. . . WASHER, Flat (AP) 310-0779-050	1		PAFZZ
	541-6029-002	13499	. . . SPACER	2		PAFZZ
-12	646-5811-001	13499	. . . . CIRCUIT CARD ASSEMBLY Microprocessor	1		PAFLD
	MS51957-27	96906	. . . . SCREW, Machine (AP) 343-0168-000	5		PAFZZ
	MS35338-136	96906	. . . . WASHER, Lock (AP) 310-0282-000	5		PAFZZ
	MS15795-805	96906	. . . . WASHER, Flat (AP) 310-0779-050	5		PAFZZ
-13	646-5822-001	13499	. . . . CIRCUIT CARD ASSEMBLY, Control logic	1		PAFLD
-14	651-8446-001	13499	. . CHASSIS, Electrical, lower	1		PAFDD

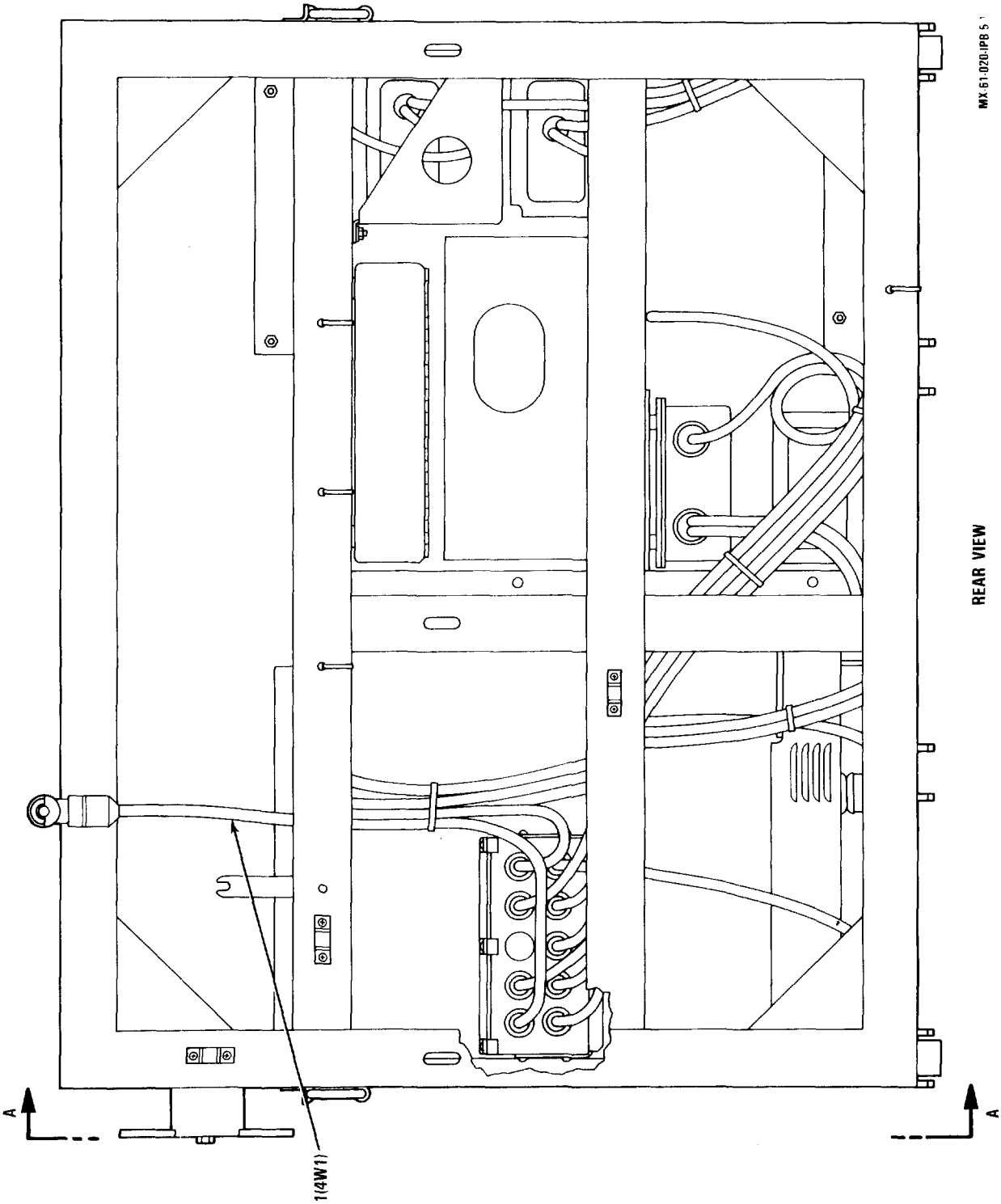


Figure 7-5. Electrical Equipment Mounting Base MT-6250/GRC-206 (Sheet 1 of 12)

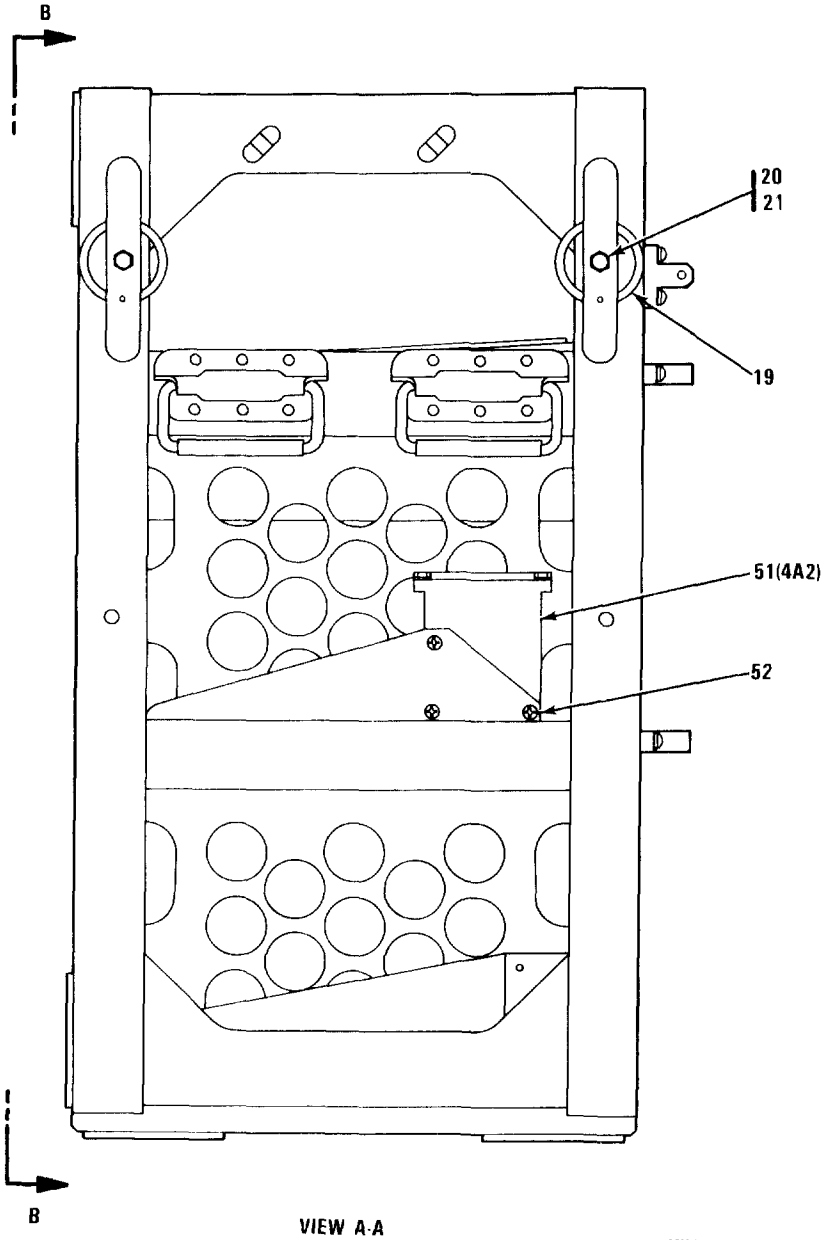


Figure 7-5. Electrical Equipment Mounting Base MT-6250/GRC-206 (Sheet 2 of 12)

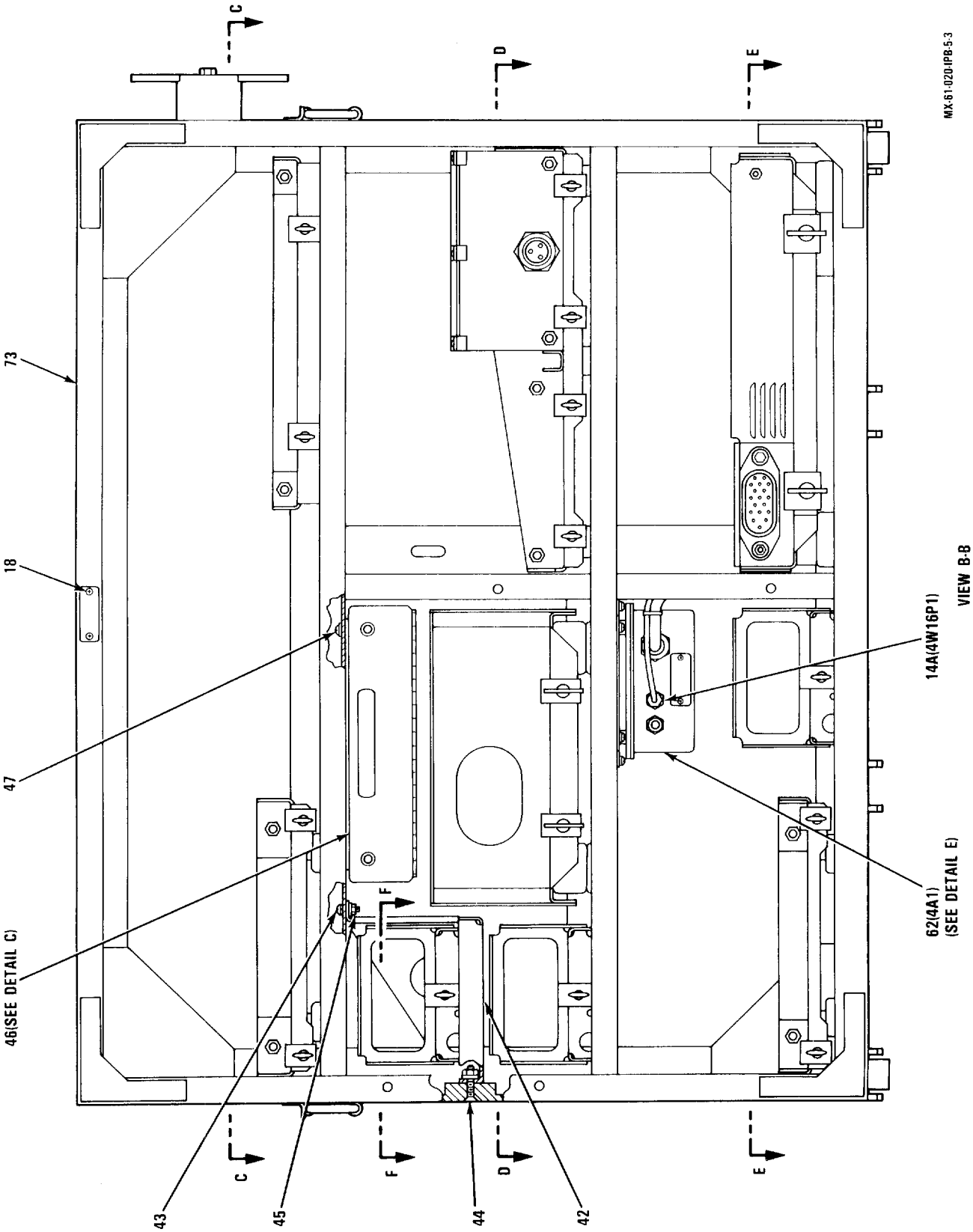


Figure 7-5. Electrical Equipment Mounting Base MT-6250/GRC-206 (Sheet 3 of 12)

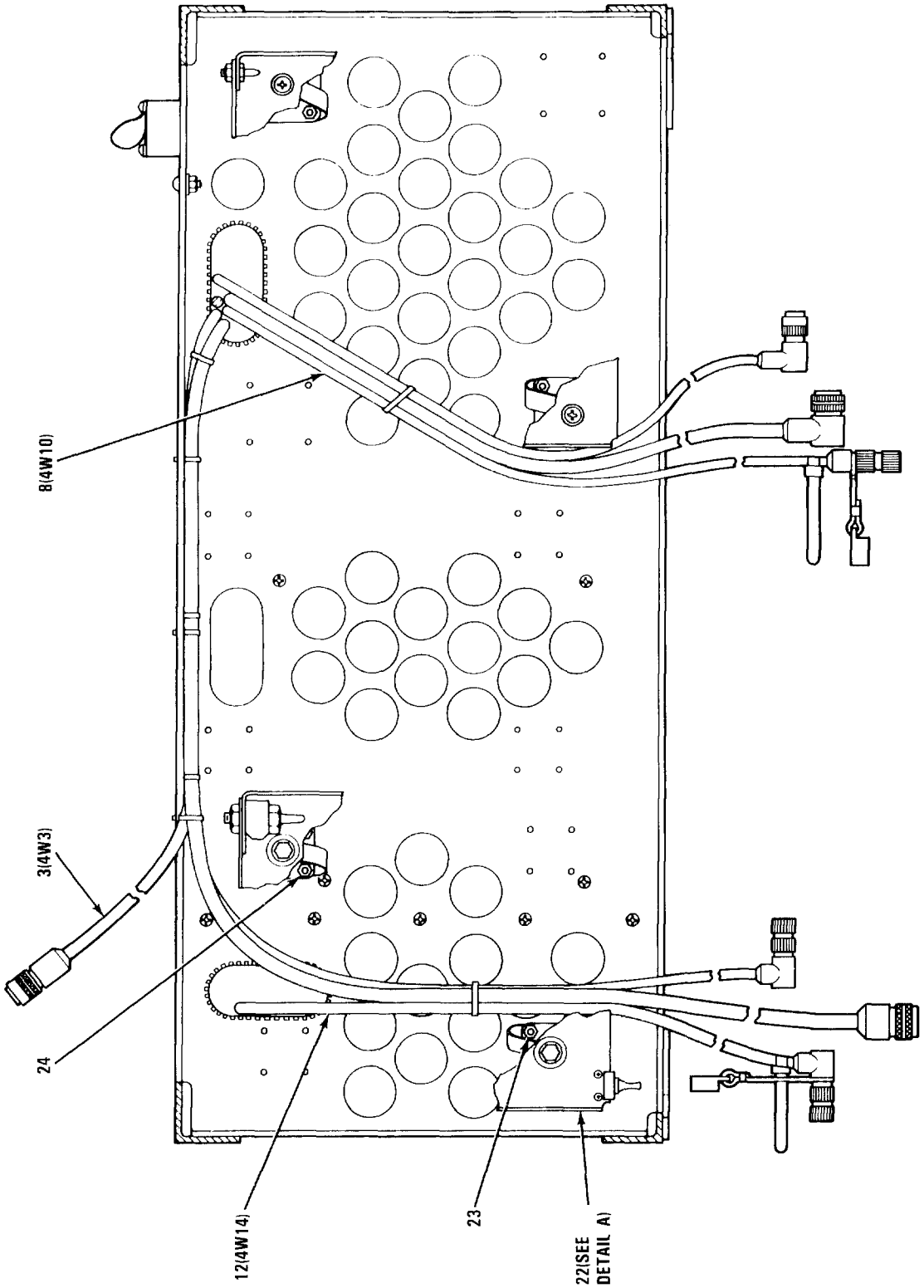


Figure 7-5. Electrical Equipment Mounting Base MT-6250/GRC-206 (Sheet 4 of 12)

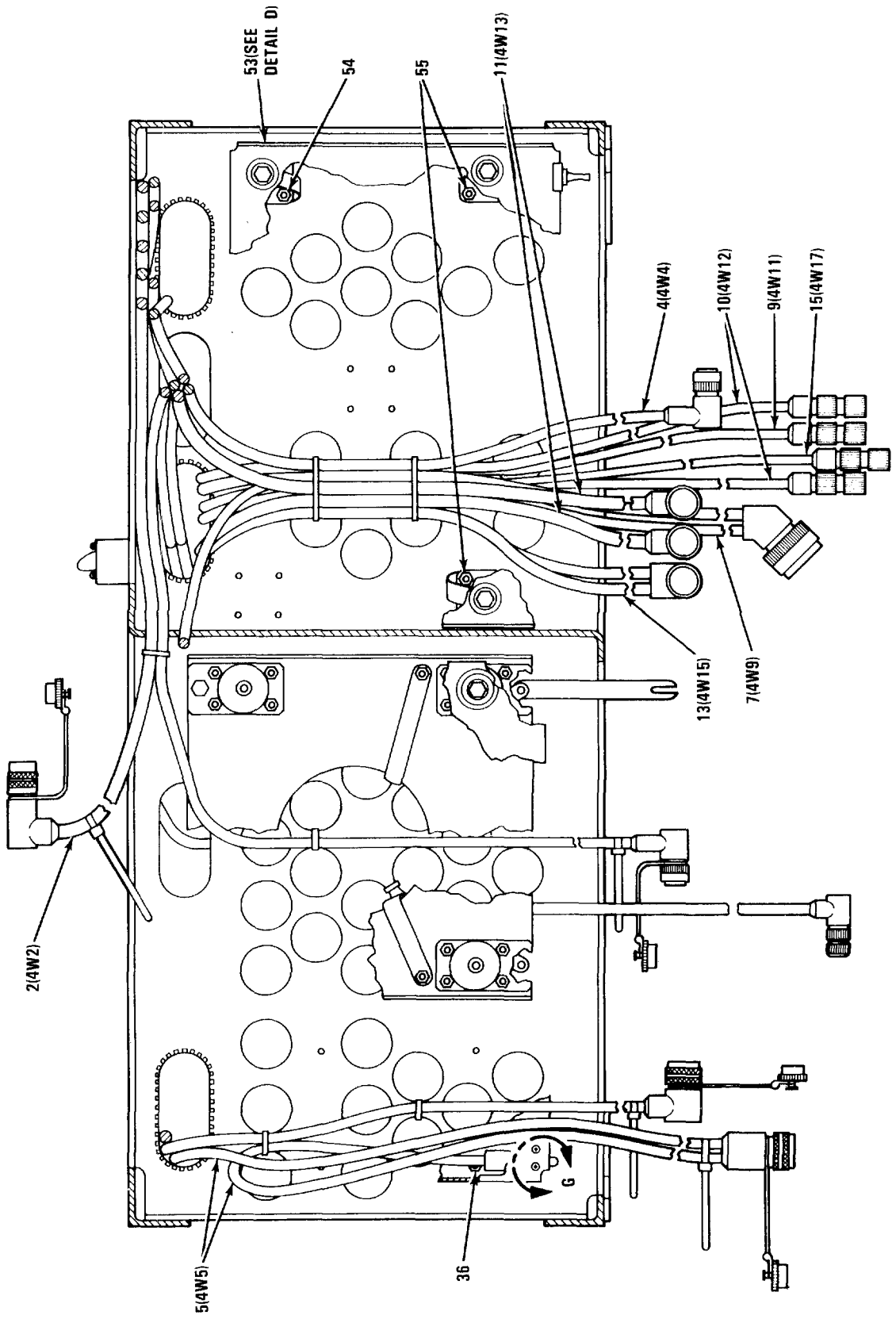


Figure 7-5. Electrical Equipment Mounting Base MT-6250/GRC-206 (Sheet 5 of 12)

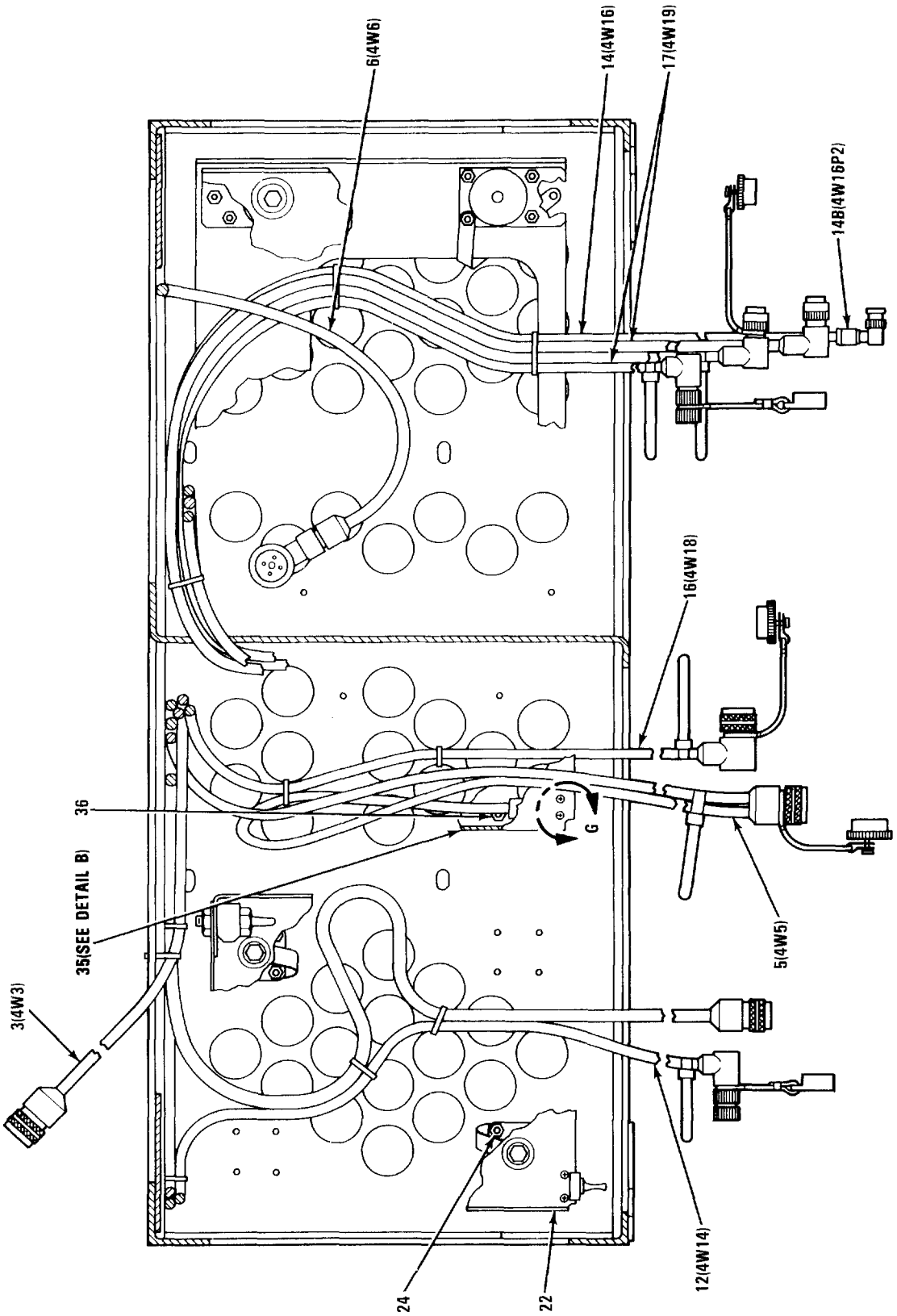


Figure 7-5. Electrical Equipment Mounting Base MT-6250/GRC-206 (Sheet 6 of 12)

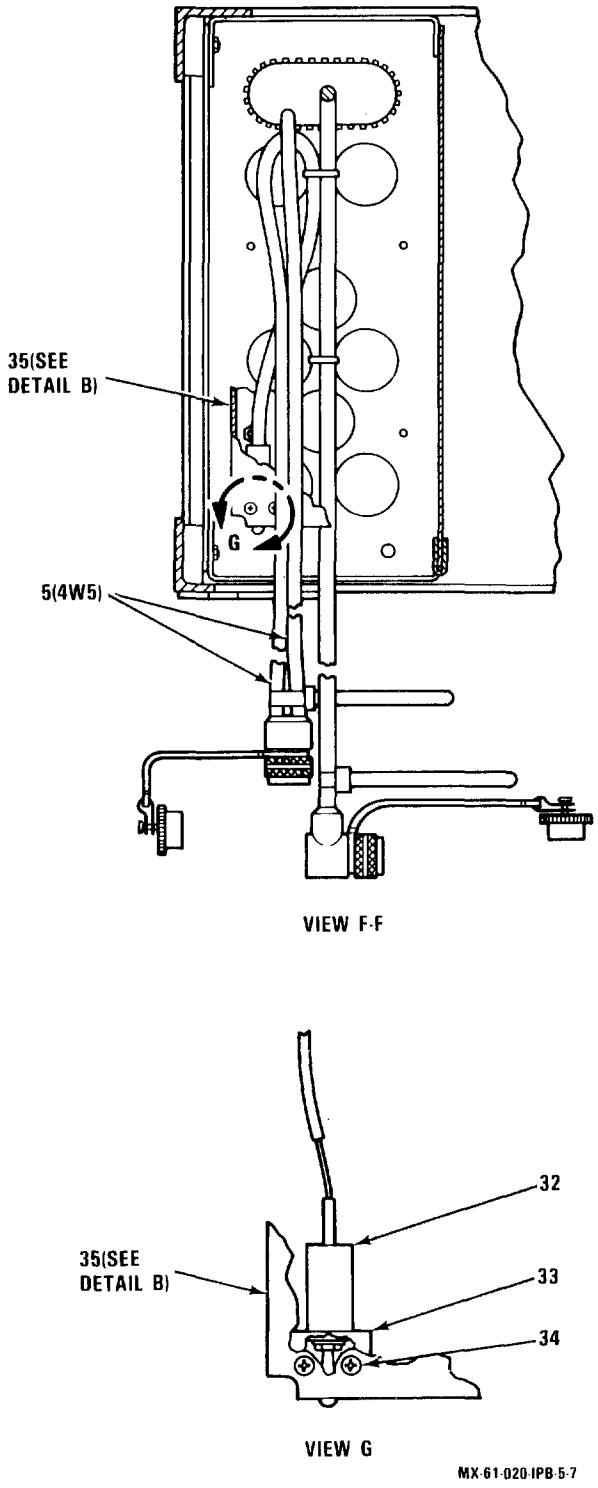


Figure 7-5. Electrical Equipment Mounting Base MT-6250/GRC-206 (Sheet 7 of 12)

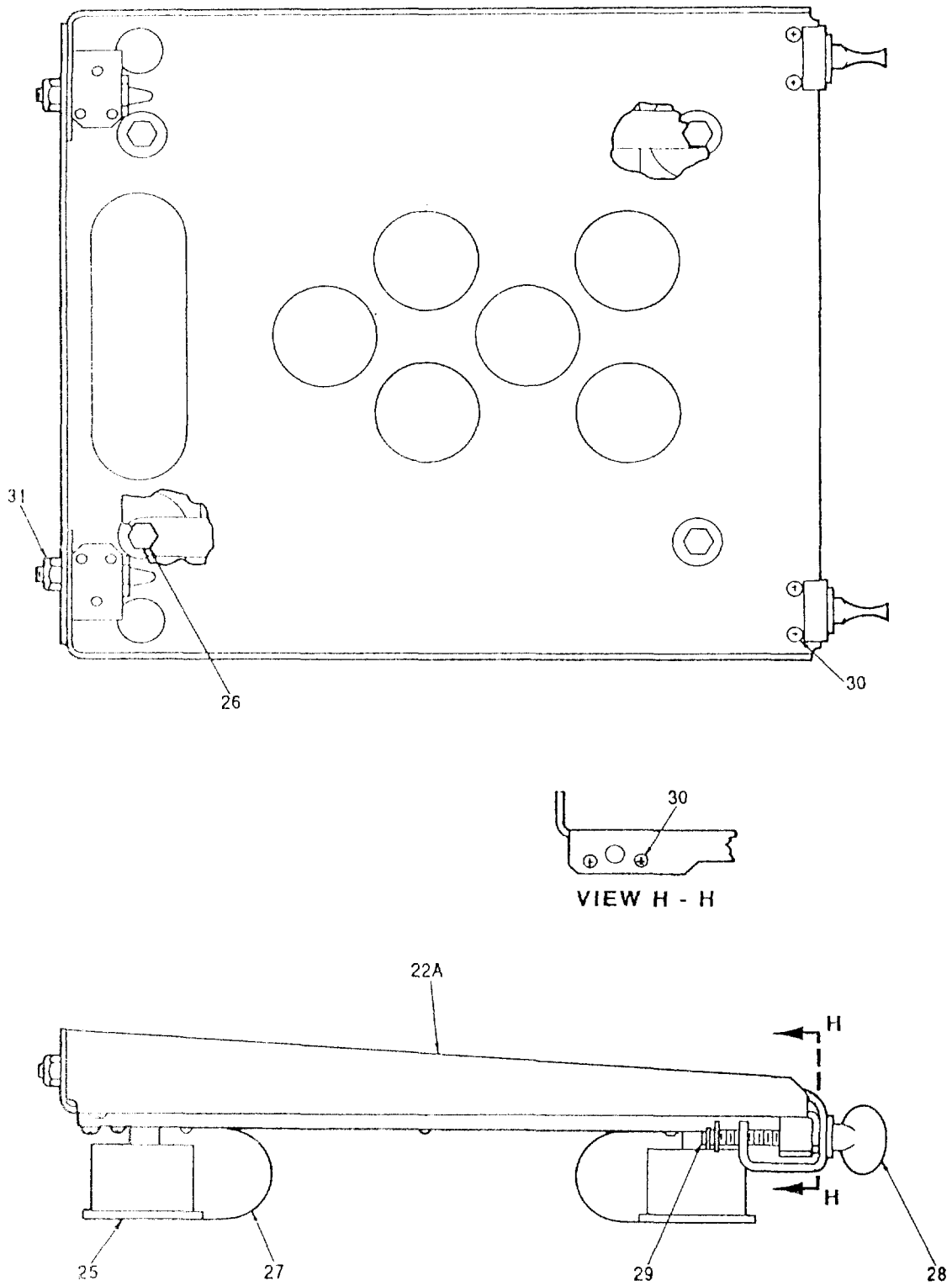


Figure 7-5. Electrical Equipment Mounting Base MT-6250/GRC-206 (Sheet 8 of 12)

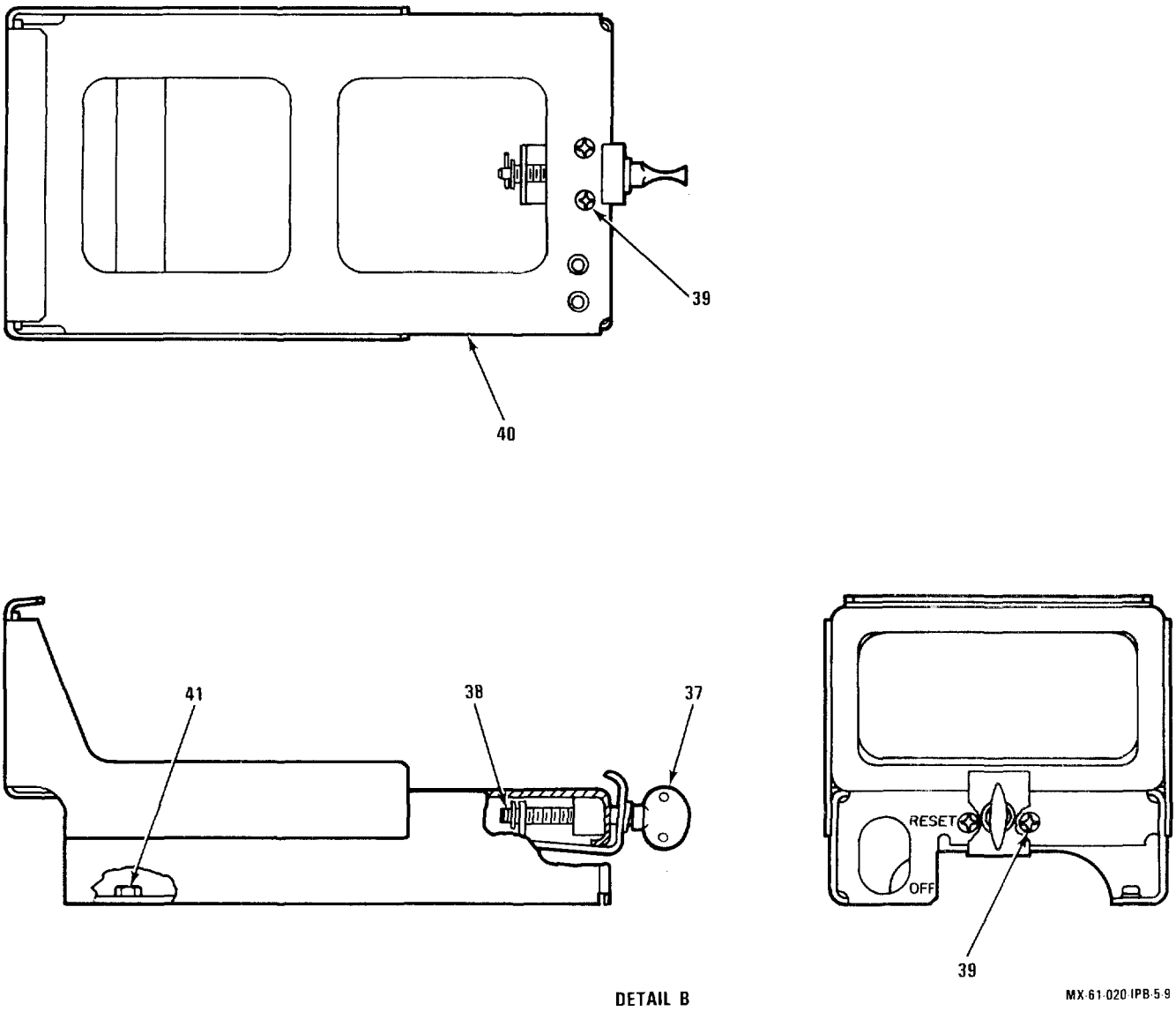


Figure 7-5. Electrical Equipment Mounting Base MT-6250/GRC-206 (Sheet 9 of 12)

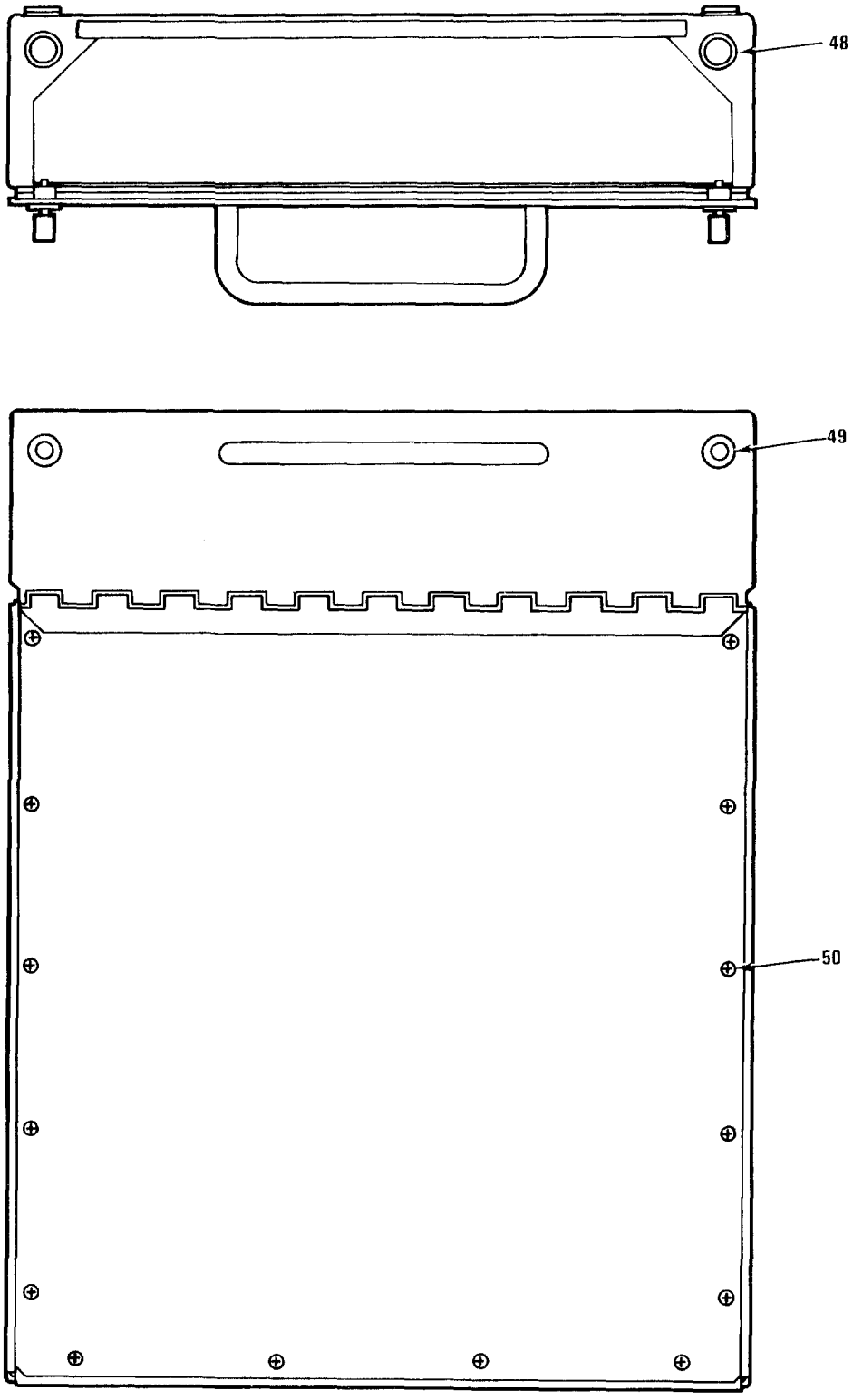


Figure 7-5. Electrical Equipment Mounting Base MT-6250/GRC-206 (Sheet 10 of 12)

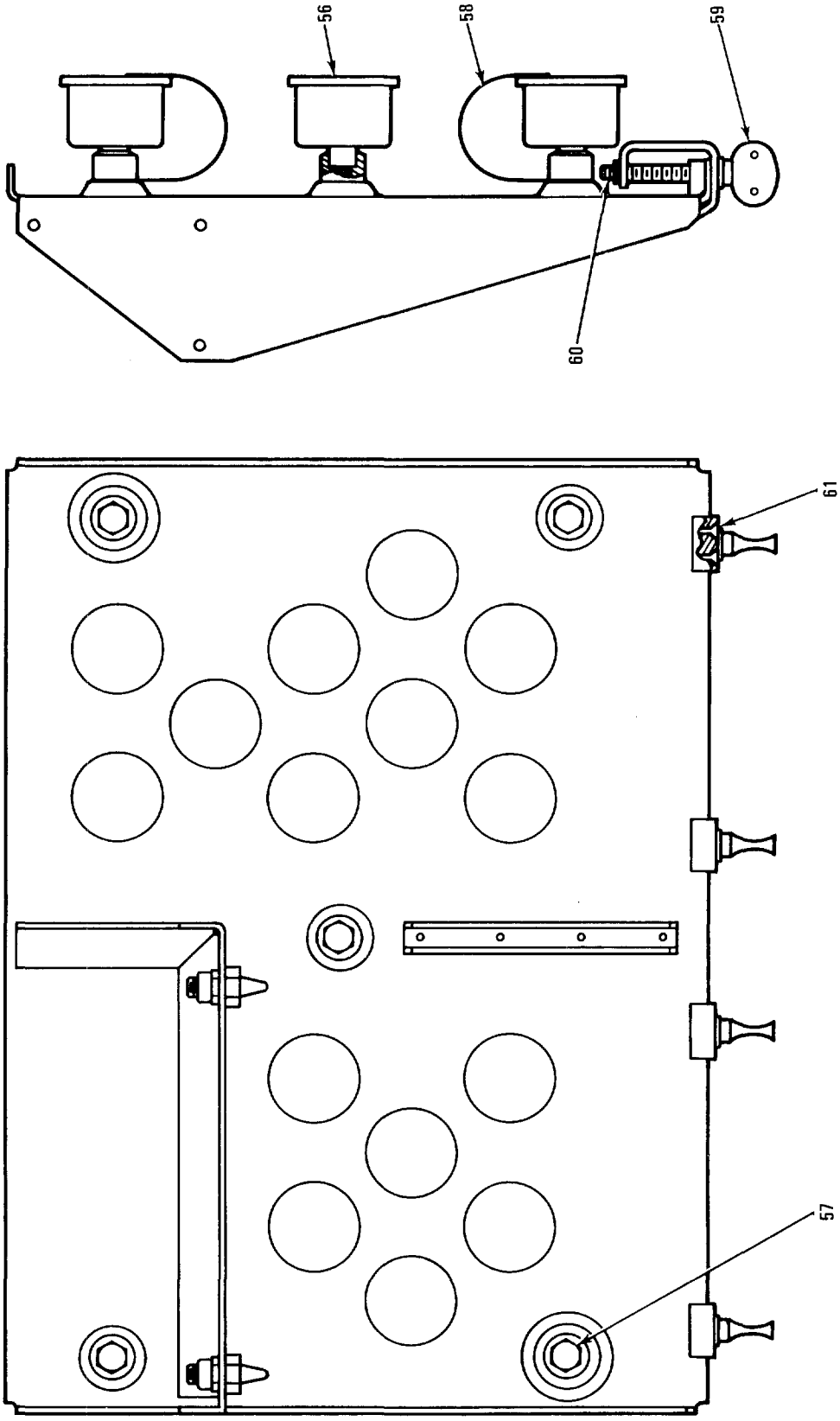


Figure 7-5. Electrical Equipment Mounting Base MT-6250/GRC-206 (Sheet 11 of 12)

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE	SMR CODE
-15	659-5855-001	13499	. . . AMPLIFIER, power	1		PAFLD
	659-5855-002	13499	. . . AMPLIFIER, power	1		XB
-16	4124X	23936	. . . FAN, Axial 009-1958-010	1		PAFZZ
-17	566084-806	37695	. CABLE ASSEMBLY, Audio	1		PB0ZZ
-18	812118-801	37655	. RT-1444 (See SL-4-07748A; TO 31R2-2PRC104-4 for bkdn) (37695) modification kit P/N 812130-801	1		PAAOO
7-5-	812084-801	37695	MOUNTING BASE, Electrical equipment MT-6250/GRC-206 (See figure 7-1 for nha)	REF	A	XB
	812084-802	37695	MOUNTING BASE, Electrical equipment MT-6250A/GRC-206 (See figure 7-1 for nha)	REF	B	XB
-1	566085-801	37695	. CABLE ASSEMBLY	1		PAOZZ
-2	566085-802	37695	. CABLE ASSEMBLY	1	A	PAOZZ
-3	566085-803	37695	. CABLE ASSEMBLY	1		PAOZZ
-4	566085-804	37695	. CABLE ASSEMBLY	1		PAOZZ
-5	566085-805	37695	. CABLE ASSEMBLY	1		PAOZZ
-6	566085-806	37695	. CABLE ASSEMBLY	1		PAOZZ
-7	566083-801	37695	. CABLE ASSEMBLY	1		PAOZZ
-8	566084-801	37695	. CABLE ASSEMBLY	1	A	PAOZZ
-9	566084-804	37695	. CABLE ASSEMBLY	1		PAOZZ
-10	566084-802	37695	. CABLE ASSEMBLY	1		PAOZZ
-11	566083-802	37695	. CABLE ASSEMBLY	1		PAOZZ
-12	566084-805	37695	. CABLE ASSEMBLY	1		PAOZZ
-13	566083-803	37695	. CABLE ASSEMBLY	1		PAOZZ
-14	566078-802	37695	. CABLE ASSEMBLY	1		MFF
-14A	M39012/16-0101	81349	. . CONNECTOR	1		PAFZZ
-14B	M39012/20-0101	81349	. . CONNECTOR	1		PAFZZ
-15	566084-803	37695	. CABLE ASSEMBLY	1		PAOZZ
-16	566083-804	37695	. CABLE ASSEMBLY	1		PAOZZ
-17	566083-805	37695	. CABLE ASSEMBLY	1		PAOZZ
-18	MS51957-11	96906	. SCREW	2		PAFZZ
-19	515167-801	37695	. BAR, Retainer	2		XB
-20	MS35307-341	96906	. SCREW (AP)	1		PAFZZ
-21	MS171496		. . PIN	1		PAFZZ
-22	812097-801	37695	. MOUNT, VRC-83	1		XB
-22A	651-8472-001	13499	. BASE, Shock mount/AM-7148	1		XB
-23	MS24693C51	96906	. SCREW (AP)	4		PAFZZ
	MS21044C08	96906	. NUT (AP)	4		PAFZZ

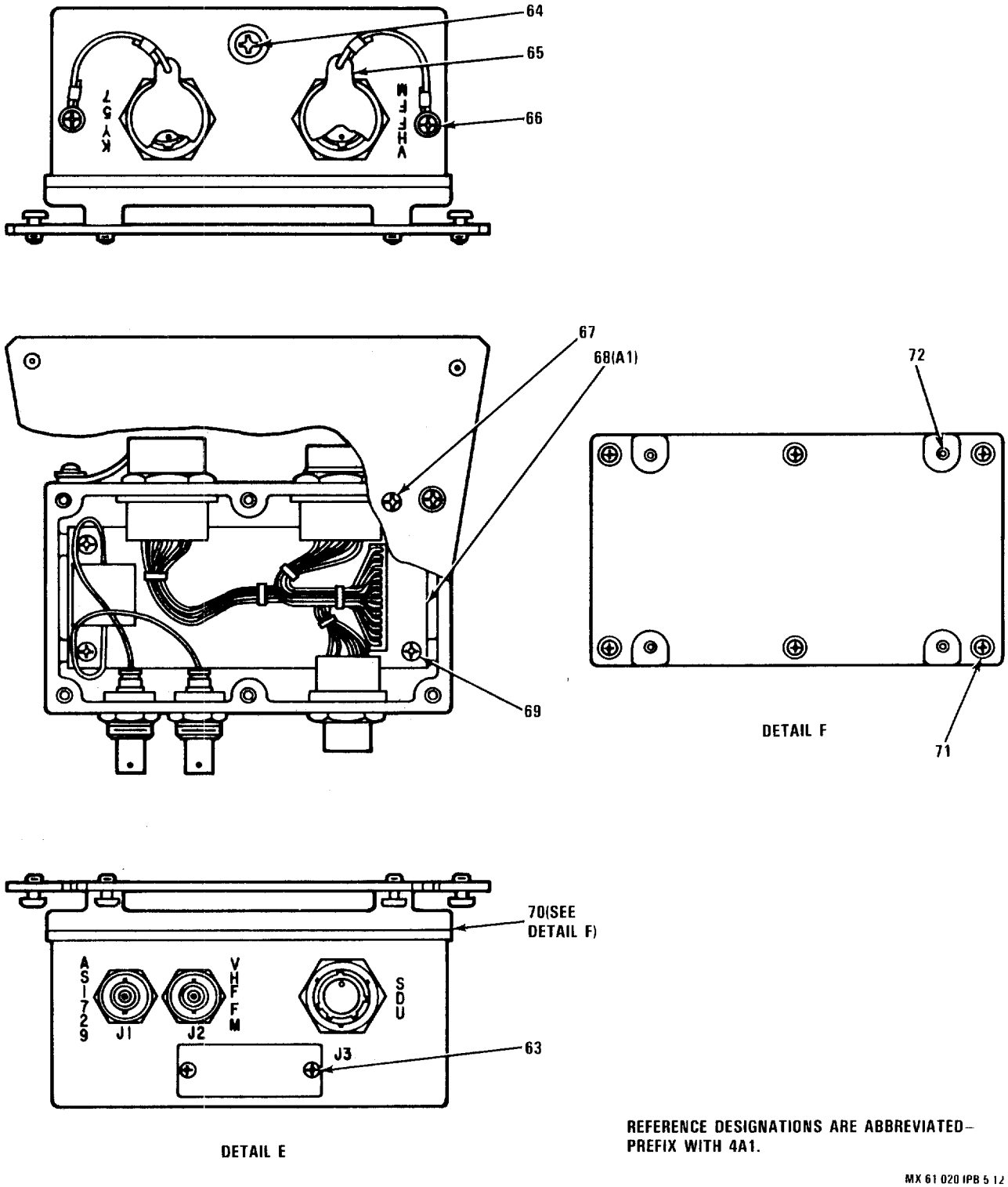


Figure 7-5. Electrical Equipment Mounting Base MT-6250/GRC-206 (Sheet 12 of 12)

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-5- 24	MS51957-46	96906	. SCREW (AP)	12		PAFZZ
	MS21044C08	96906	. NUT (AP)	12		PAFZZ
- 25	T44-AB-10	81860	. . MOUNT, Resilient ..... (Magnavox spec cont dwg 435653-1)	4		PAFZZ
- 26	MS35308-303	96906	. . SCREW (AP)	1		PAFZZ
	MS35338-139	96906	. . WASHER (AP)	1		PAFZZ
- 27	938770-1	37695	. . STRAP, Ground	2		PAFZZ
- 28	136539-1	37695	. . THUMBSCREW	2		PAFZZ
- 29	MS24665-151	96906	. . PIN (AP)	1		PAFZZ
	NAS620C10	80205	. . WASHER (AP)	1		PAFZZ
	MS15795-810	96906	. . WASHER (AP)	1		PAFZZ
- 30	MS24693C3	96906	. . SCREW	8		PAFZZ
- 31	136279-4	37695	. . PIN, Retainer	2		PAFZZ
	MS21044C5	96906	. . NUT (AP)	1		PAFZZ
- 32	M39019/01-218	81349	. CIRCUIT BREAKER	1	A	PAFZZ
- 33	938713-801	37695	. BRACKET, Mounting	3	A	XB
- 34	MS24693C26	96906	. SCREW (AP)	2	A	PAFZZ
	M45938/5-6C	96906	. . NUT	2	A	PAFZZ
- 35	812137-801	37695	. MOUNT, KY-57	3	A	XB
- 36	MS51957-45	96906	. SCREW (AP)	4	A	PAFZZ
- 37	136539-1	37695	. . THUMBSCREW	1	A	PAFZZ
- 38	MS24665-151	96906	. . PIN (AP)	1	A	PAFZZ
	NAS620C10	80205	. . WASHER (AP)	1	A	PAFZZ
	MS15795-810	96906	. . WASHER (AP)	1	A	PAFZZ
- 39	MS24693C3	96906	. . SCREW	4	A	PAFZZ
- 40	938676-801	37695	. . TRAY, KY-57 mount	1	A	XB
- 41	M45938/5-7C	96906	. . . NUT	4	A	PAFZZ
- 42	939189-801	37695	. SHELF, KY-57	1	A	XB
- 43	MS51957-46	96906	. SCREW (AP)	5	A	PAFZZ
- 44	MS24693C279	96906	. SCREW (AP)	2	A	PAFZZ
- 45	MS21076L08	96906	. . NUT	5	A	PAFZZ
- 46	813199-801	37695	. BOX, Storage rack	1		XB
- 47	MS51958-65	96906	. SCREW (AP)	4		PAFZZ
	MS35338-138	96906	. WASHER (AP)	4		PAFZZ
- 48	15R1-1AC	71286	. . RECEPTACLE, Turnlock .... (Magnavox spec cont dwg 135143-1)	2		PAFZZ
	MS25082-21	96906	. . NUT (AP)	1		PAFZZ
- 49	15S1-3-1AC	71286	. . STUD, Pushbutton ..... fastener (Magnavox spec cont dwg 135144-102)	2		PAFZZ

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-5-	15S-11-2AE	71286	. . SOCKET, Pushbutton ..... fastener (AP) (Magnavox spec cont dwg 135182-1)	1		PAFZZ
50	MS24693C1	96906	. . SCREW	14		PAFZZ
- 51	812119-801	37695	. JUNCTION UNIT, Power	1		PAODD
- 52	MS51957-43	96906	. SCREW (AP)	6		PAFZZ
	MS35338-137	96906	. WASHER (AP)	6		PAFZZ
- 53	812098-801	37695	. MOUNT, Power distribution .	1		XB
- 54	MS51957-46	96906	. SCREW (AP)	12		PAFZZ
	MS21044C08	96906	. NUT (AP)	12		PAFZZ
- 55	MS24693C51	96906	. SCREW (AP)	4		PAFZZ
	MS21044C08	96906	. NUT (AP)	4		PAFZZ
- 56	T44-AB-10	81860	. . MOUNT, Resilient ..... (Magnavox spec cont dwg 435653-1)	5		PAFZZ
- 57	MS35308-306	96906	. . SCREW (AP)	1		PAFZZ
	MS35338-139	96906	. . WASHER (AP)	1		PAFZZ
- 58	938770-1	37695	. . STRAP, Ground	2		PAFZZ
- 59	136539-1	37695	. . THUMBSCREW	4		PAFZZ
- 60	MS24665-151	96906	. . PIN (AP)	1		PAFZZ
	NAS620C10	80205	. . WASHER (AP)	1		PAFZZ
	MS15795-810	96906	. . WASHER (AP)	1		PAFZZ
- 61	MS24693C3	96906	. . SCREW	8		PAFZZ
- 62	812132-801	37695	. INTERFACE ASSEMBLY, FM .... BITE/AUDIO	1		PAOLD
- 63	MS51957-11	96906	. . SCREW	2		PAFZZ
- 64	MS3213-31	96906	. . SCREW	1		PAFZZ
- 65	812187-804	37695	. . CAP ASSEMBLY, Connector .	2		PAFZZ
- 66	MS51957-14B	96906	. . SCREW (AP)	1		PAFZZ
	MS35338-135B	96906	. . WASHER (AP)	1		PAFZZ
	514919-1	37695	. . RETAINER (AP)	1		PAFZZ
- 67	MS24693C47	96906	. . SCREW	4		PAFZZ
- 68	812424-801	37695	. . CIRCUIT CARD ASSEMBLY ...	1		PAFLD
- 69	MS51957-13	96906	. . SCREW (AP)	4		PAFZZ
	NAS620C4	80205	. . WASHER (AP)	4		PAFZZ
- 70	660177-801	37695	. . COVER, FM BITE/AUDIO	1		XB
- 71	136555-1	37695	. . . SCREW, Modified	6		PAFZZ
	NAS620C6	80205	. . . WASHER	6		PAFZZ
- 72	MS21209C0815	96906	. . . INSERT	4		PAFZZ
- 73	514816-801	37695	. RACK WELDMENT, Equipment .. mounting	1		XB

A - Used on 812084-801 only
B - Used on 812084-802 only

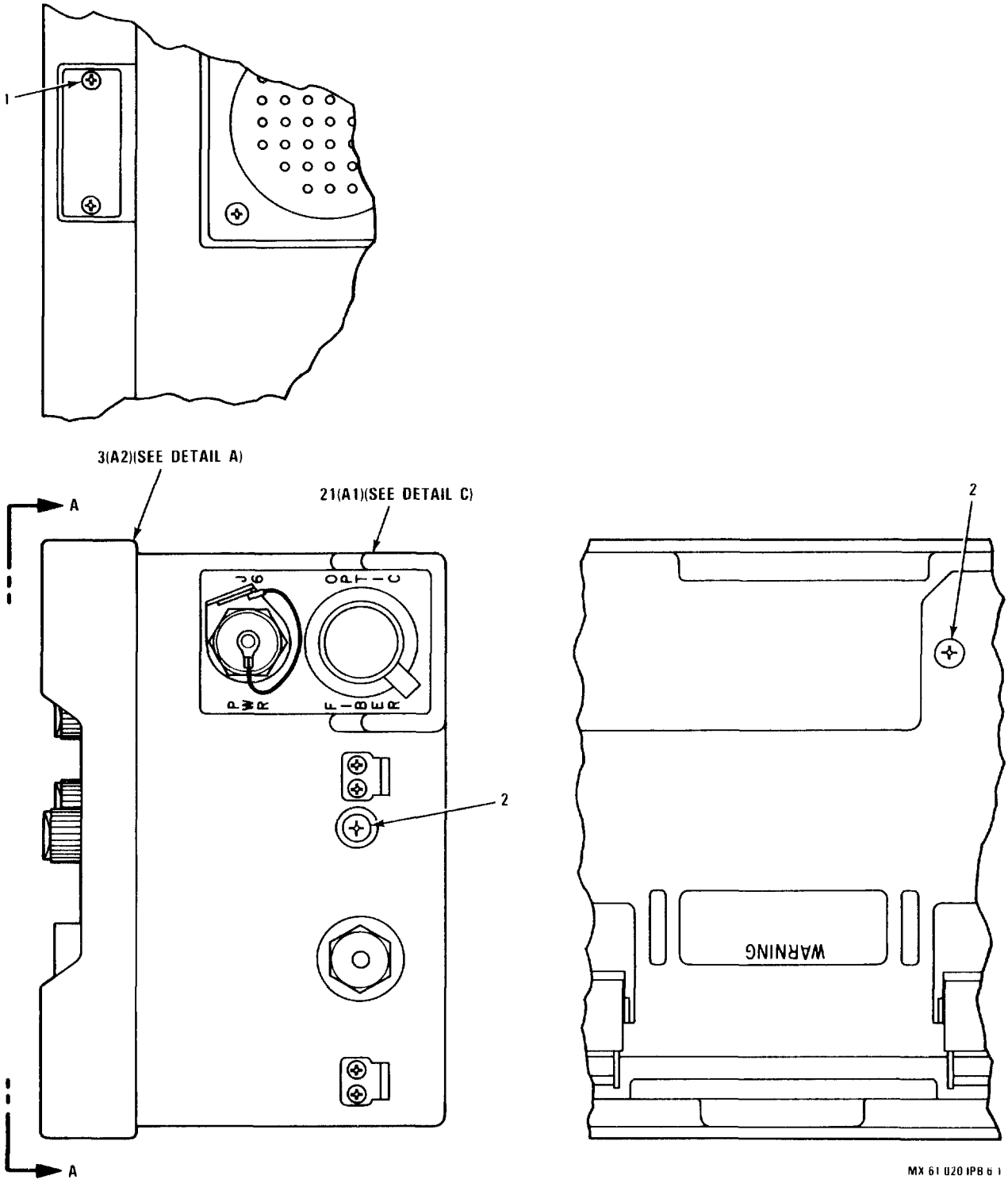
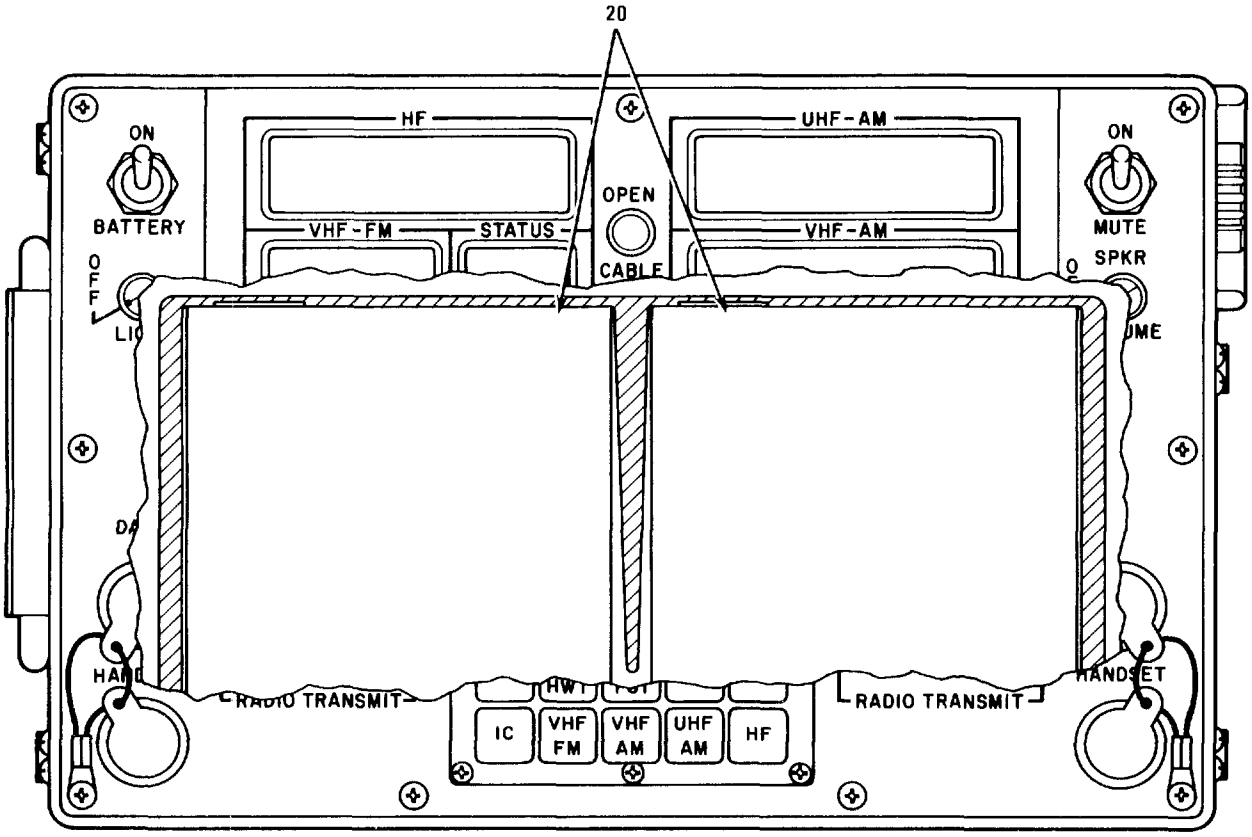


Figure 7-6. Radio Set Control C-11166/GRC-206 (Sheet 1 of 7)



VIEW A-A

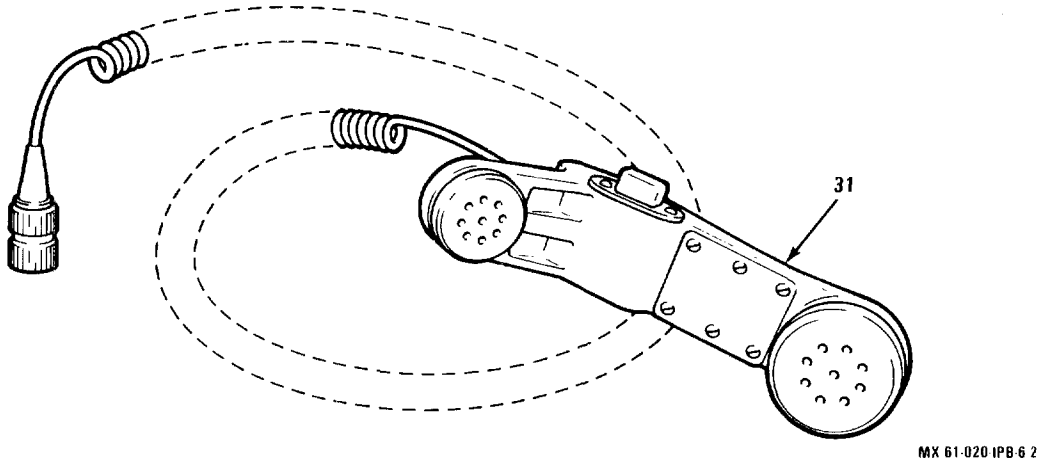


Figure 7-6. Radio Set Control C-11166/GRC-206 (Sheet 2 of 7)

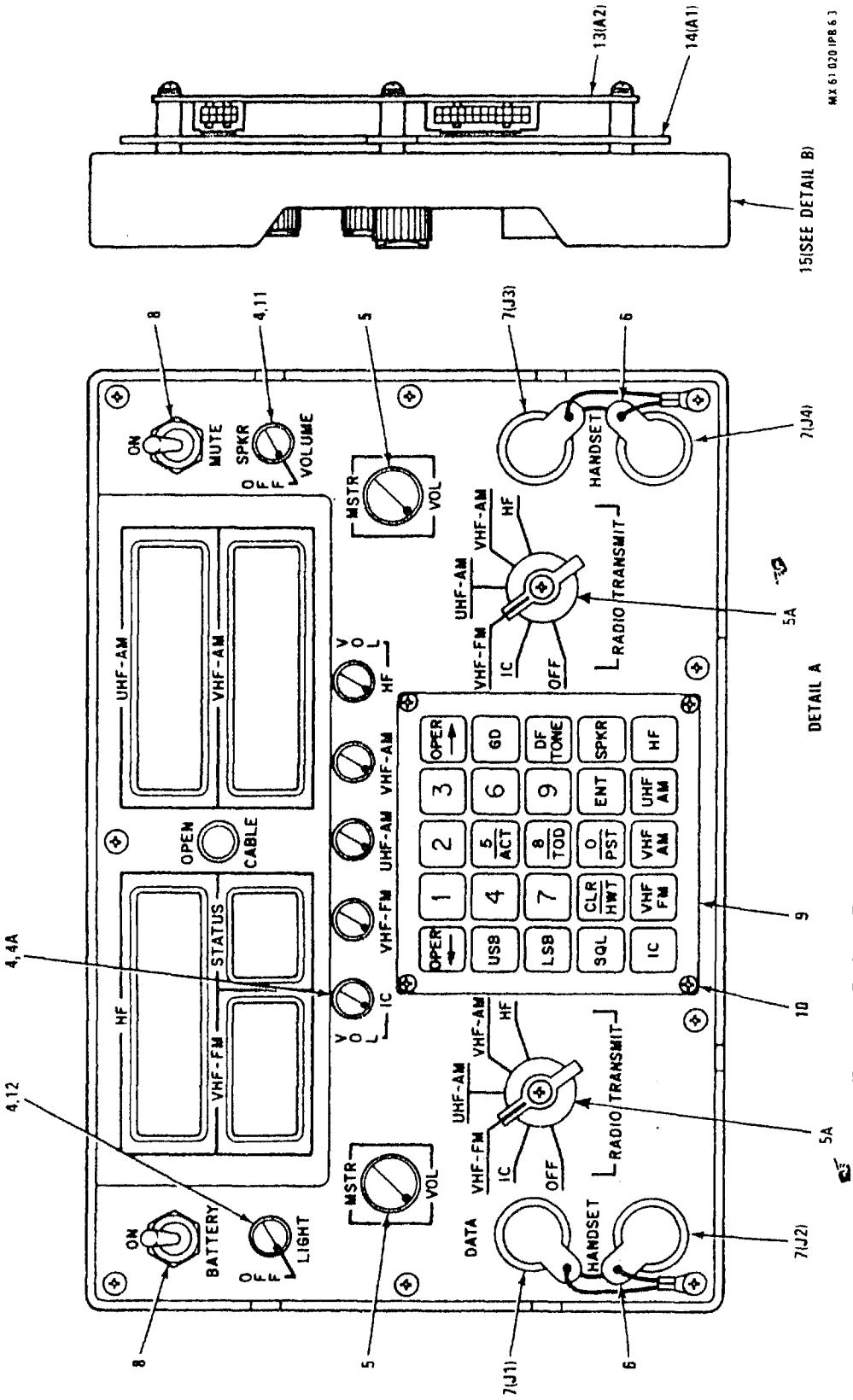


Figure 7-6. Radio Set Control C-11166/GRC-206 (Sheet 3 of 7)

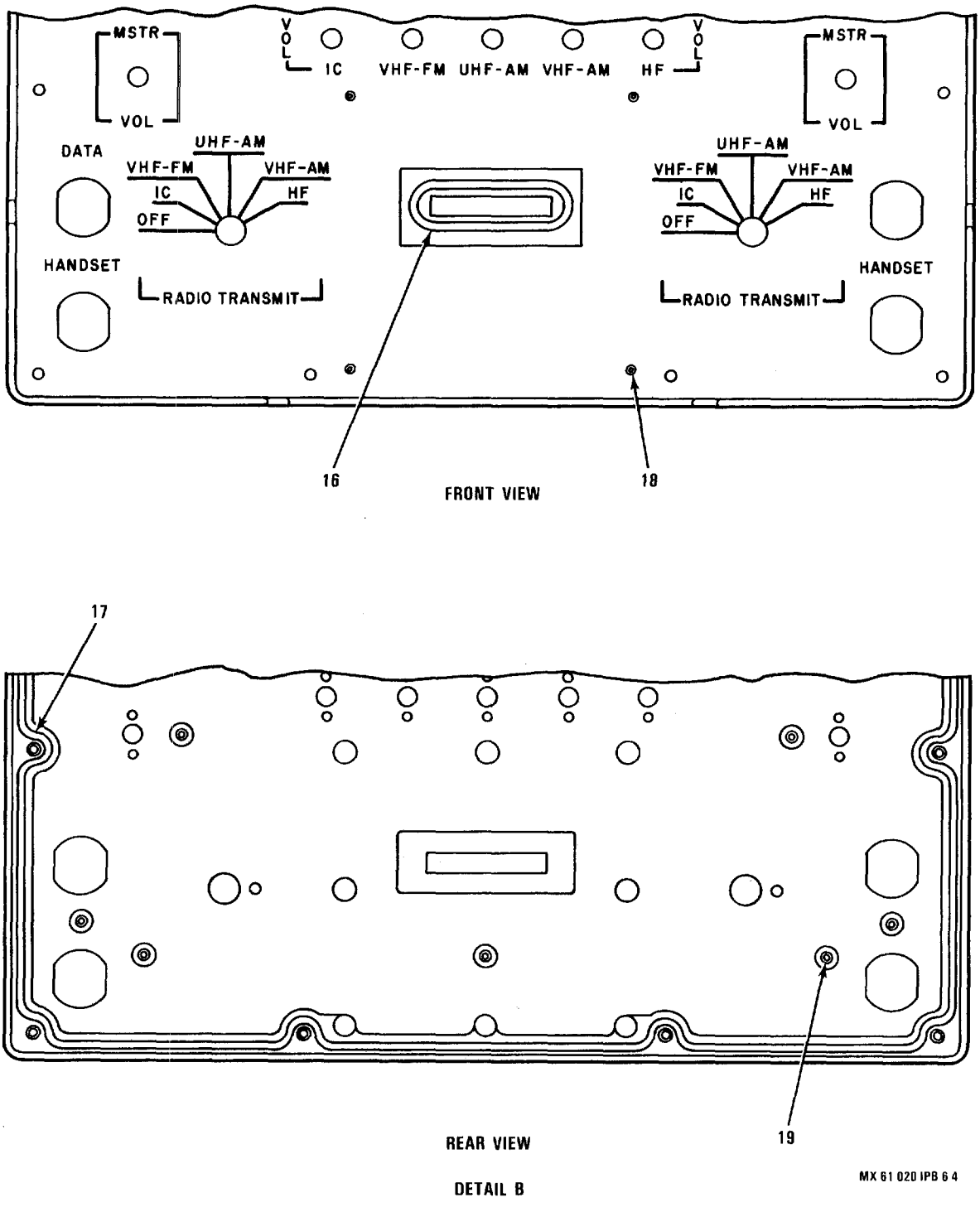


Figure 7-6. Radio Set Control C-11166/GRC-206 (Sheet 4 of 7)

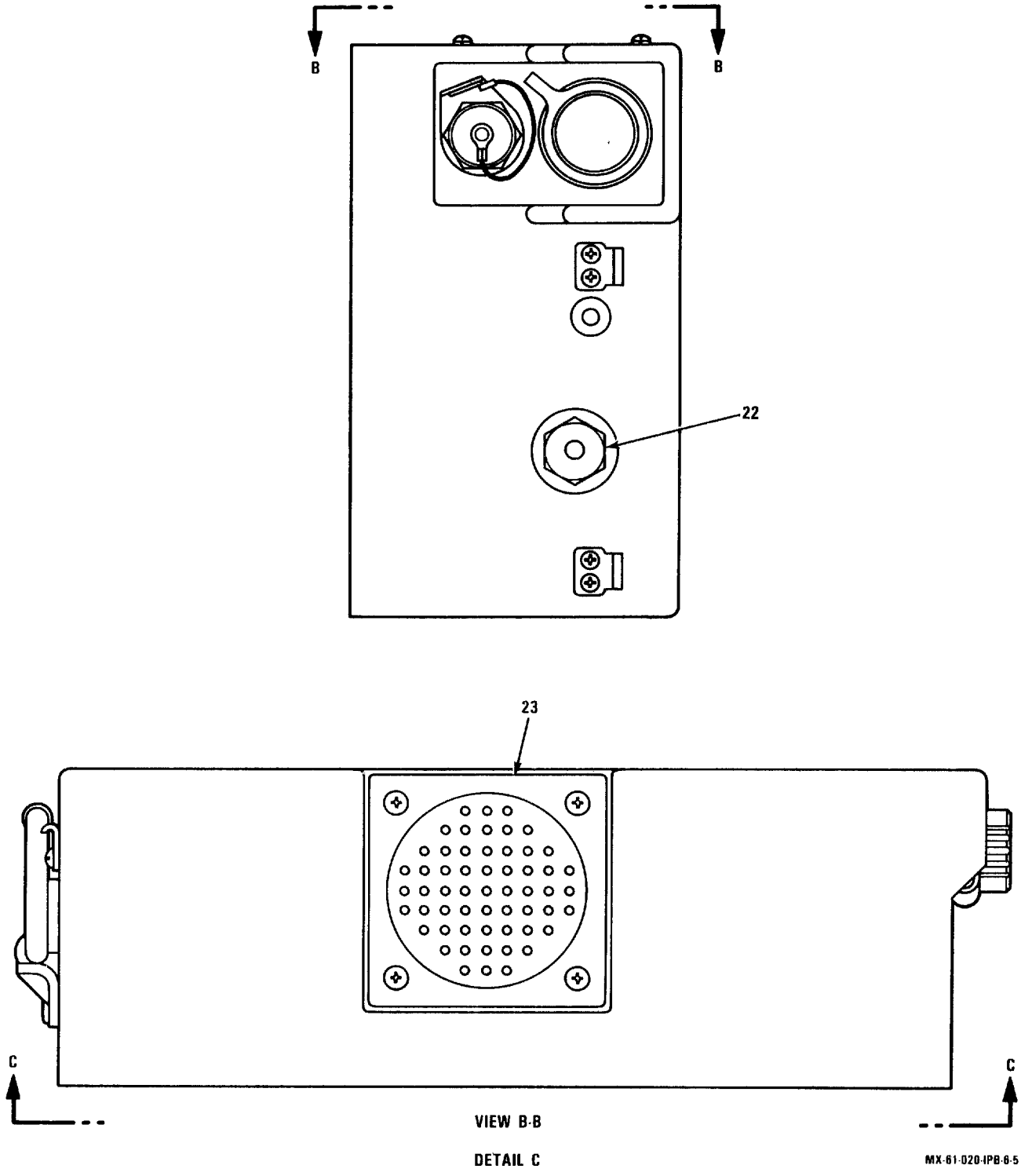


Figure 7-6. Radio Set Control C-11166/GRC-206 (Sheet 5 of 7)

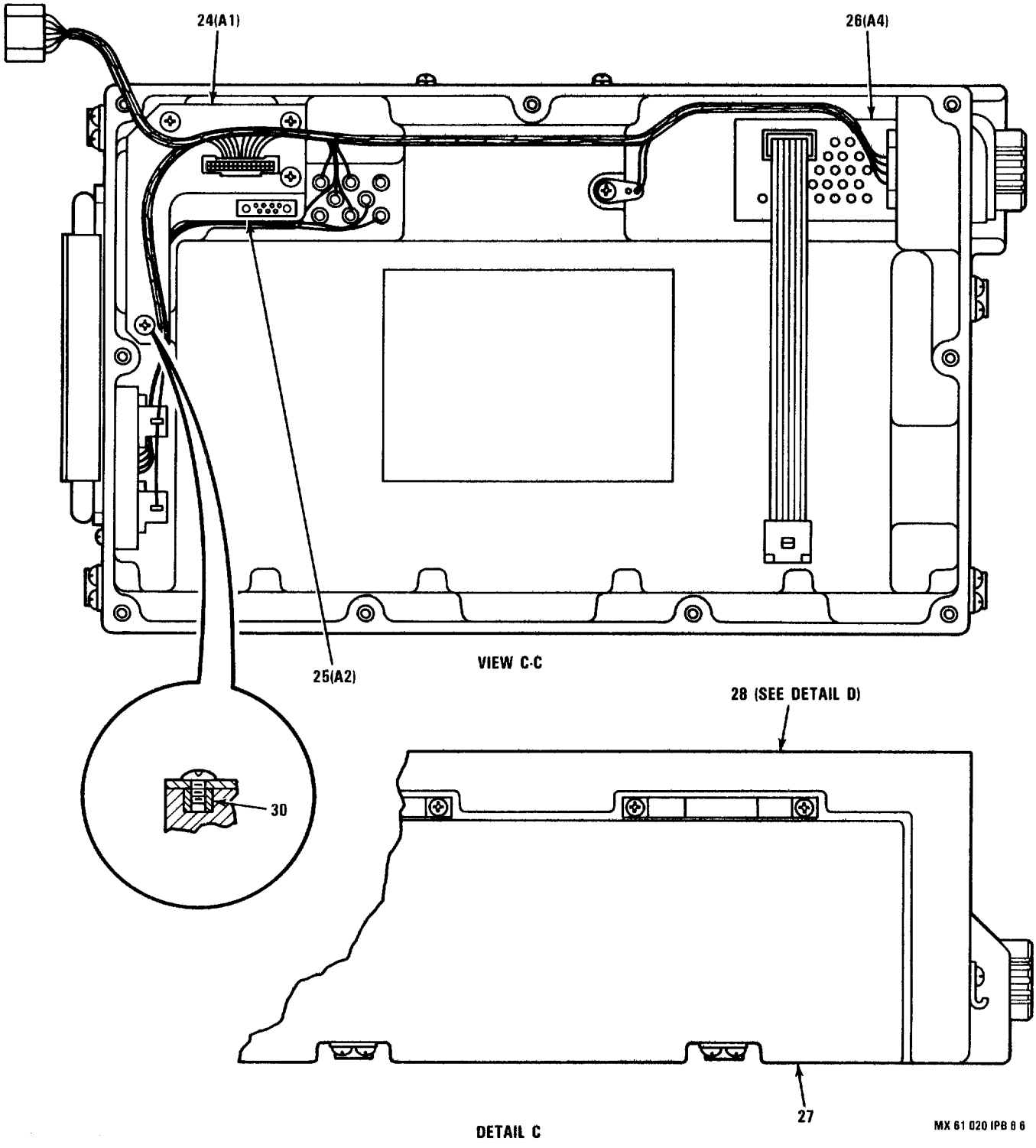
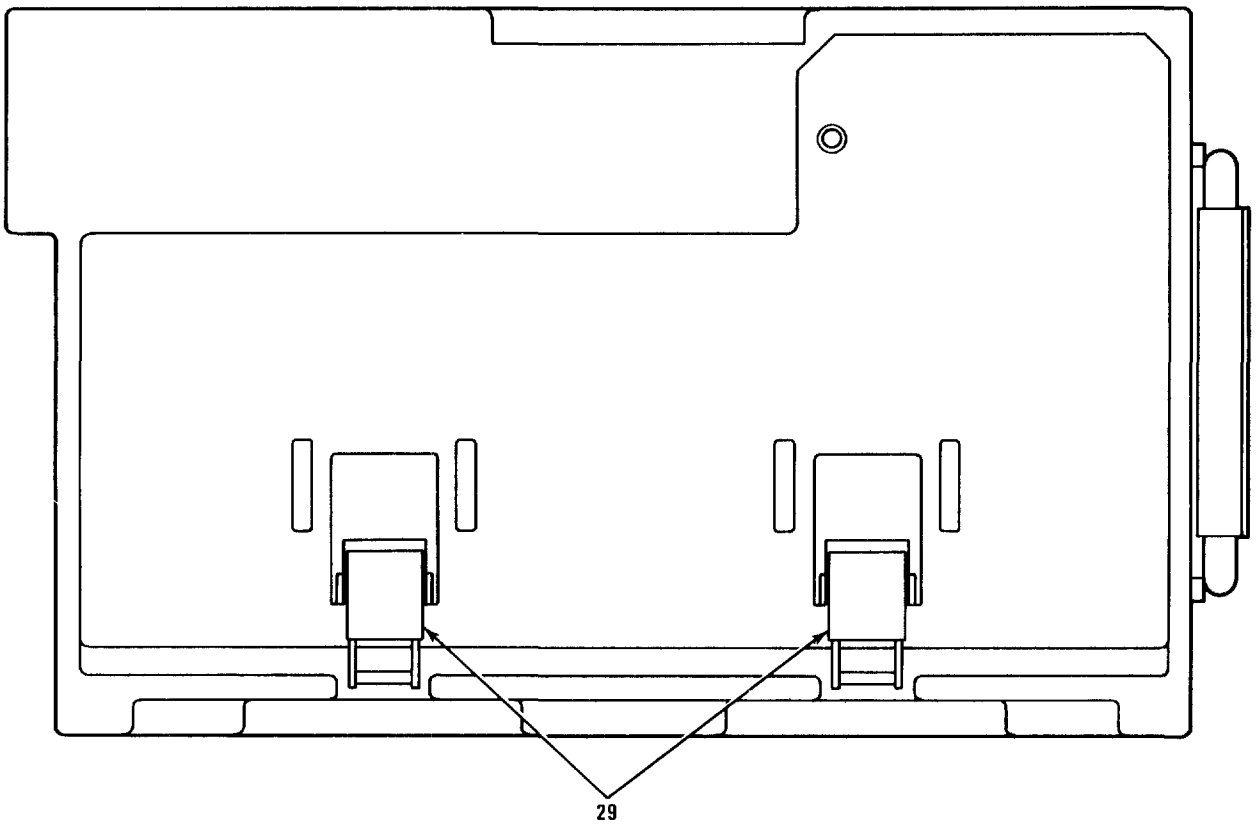


Figure 7-6. Radio Set Control C-11166/GRC-206 (Sheet 6 of 7)



DETAIL D MX 61 020 IP8 6 7

Figure 7-6. Radio Set Control C-11166/GRC-206 (Sheet 7 of 7)

FIGURE & INDEX / SHEET NO.	PART NUMBER	CAGE	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-6-	812085-801	37695	CONTROL, Radio set C-11166/GRC-206 (See Figure 7-1 for NHA)	REF		PAODD
-1	MS51957-11	96906	. SCREW	2		PAFZZ
-2	MS3213-11	96906	. SCREW	2		PAFZZ
-3	812120-801	37695	. PANEL ASSEMBLY, URSC	1		PAOFD
-4	MS91528-0E1B	96906	. . KNOB	7		PAFZZ
-4A	RV65A4103C	81349	. . RESISTOR, Variable	5		PAFZZ
-5	MS91528-1E1B	96906	. . KNOB	2		PAFZZ
-6	813198-801	37695	. . CAP ASSEMBLY, Connector, (Preferred part)	2		PAFZZ
	SM-B-447440	80063	. CAP ASSEMBLY, Connector (Alternate part)			PAOZZ
-7	814341-801	37695	. . CONNECTOR ASSEMBLY, Filter	4		PAFZZ
-8	MS27719-23	96906	. . SWITCH	2		PAFZZ
	MS25081 C4	96906	. . WASHER (AP)	1		PAFZZ
-9	ML25-26-MBE-6	51163	. . KEYBOARD, Sealed (Magnavox spec. cont dwg 626483-4)	1		PAFZZ
-10	MS51957-17B	96906	. . SCREW (AP)	4		PAFZZ
	NAS620C4	80205	. . WASHER(AP)	4		PAFZZ
-11	CM43842-4	50516	. . RESISTOR, Variable	1		PAFZZ
-12	CM43842-7	50516	. . RESISTOR, Variable	1		PAFZZ
-13	812133-801	37695	. . CIRCUIT CARD ASSEMBLY	1		PAFLD
-14	812126-801	37695	. . CIRCUIT CARD ASSEMBLY	1		PAFLD
-15	660155-801	37695	. . PANEL, Unified radio set control	1		XB
-16	348403-3	37695	. . . GASKET, Rubber	1		PAFZZ
-17	348294-2	37698	. . . GASKET, Seal	1		PAFZZ
-19	MS122118	96906	. . . INSERT	7		PAFZZ
-20	BB-590/U	80058	. BATTERY, Storage (GFE)	2		PAOZZ
-21	812092-801	37695	. CASE ASSEMBLY, URSC	1		XB
-22	722385-801	37695	. . VALVE, Pressure relief (Magnavox spec cont dwg 435683-1)	1		PAFZZ
-23	H-301-16	60073	. . LOUDSPEAKER, 3-inch (Magnavox spec cont dwg 588258-2)	1		PAFZZ
	MS51957-46B	96906	. . SCREW (AP)	4		PAFZZ
-24	812866-801	37695	. . CIRCUIT CARD ASSEMBLY, URSC regulator	1		PAFLD
-25	812933-801	37695	. . DRIVER SUBASSEMBLY, Back lighting	1		PAFZZ
-26	812099-801	37695	. . MODULE, Fiber optic	1		PAFLD
-27	514900-801	37695	. . DOOR, Battery	1		PAFZZ

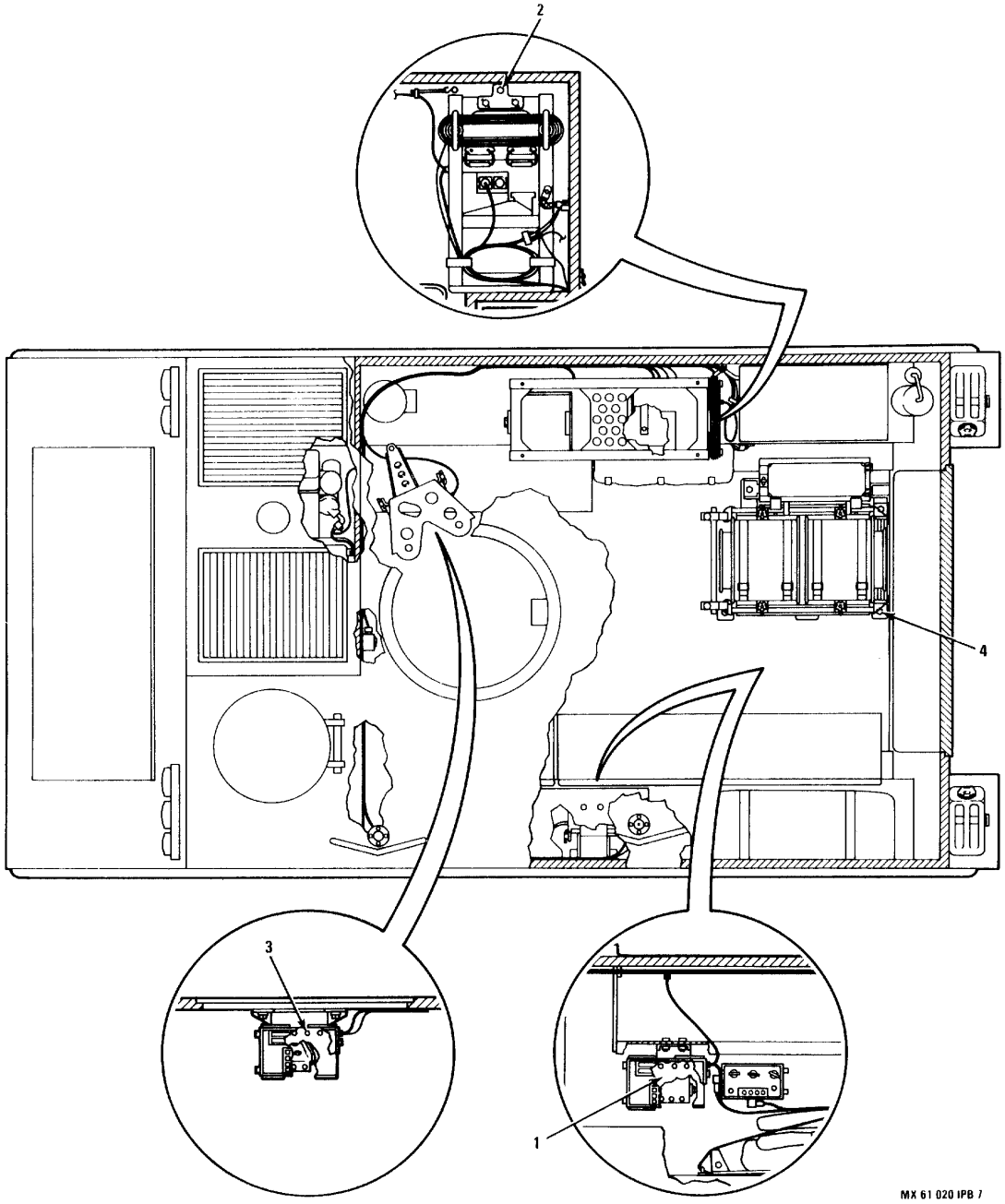
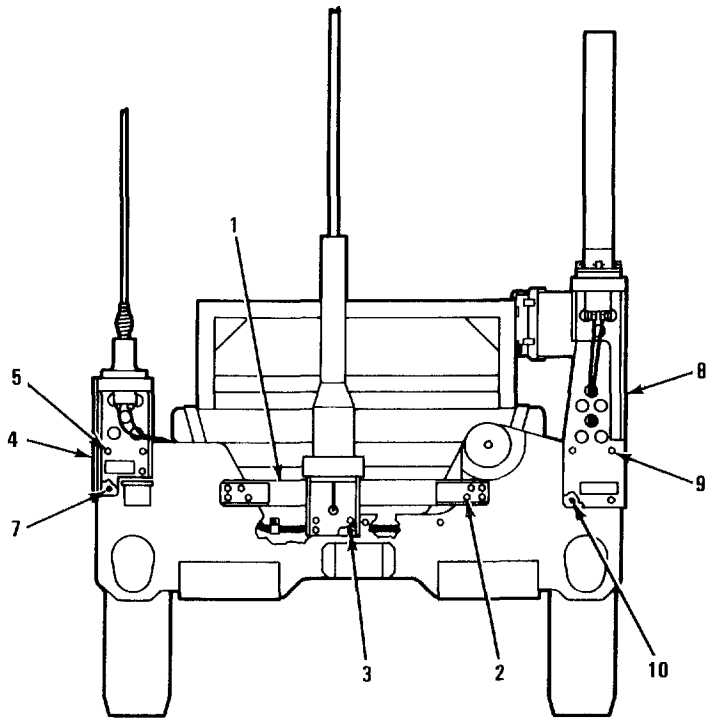


Figure 7-7. Installation Kit



VIEW A-A

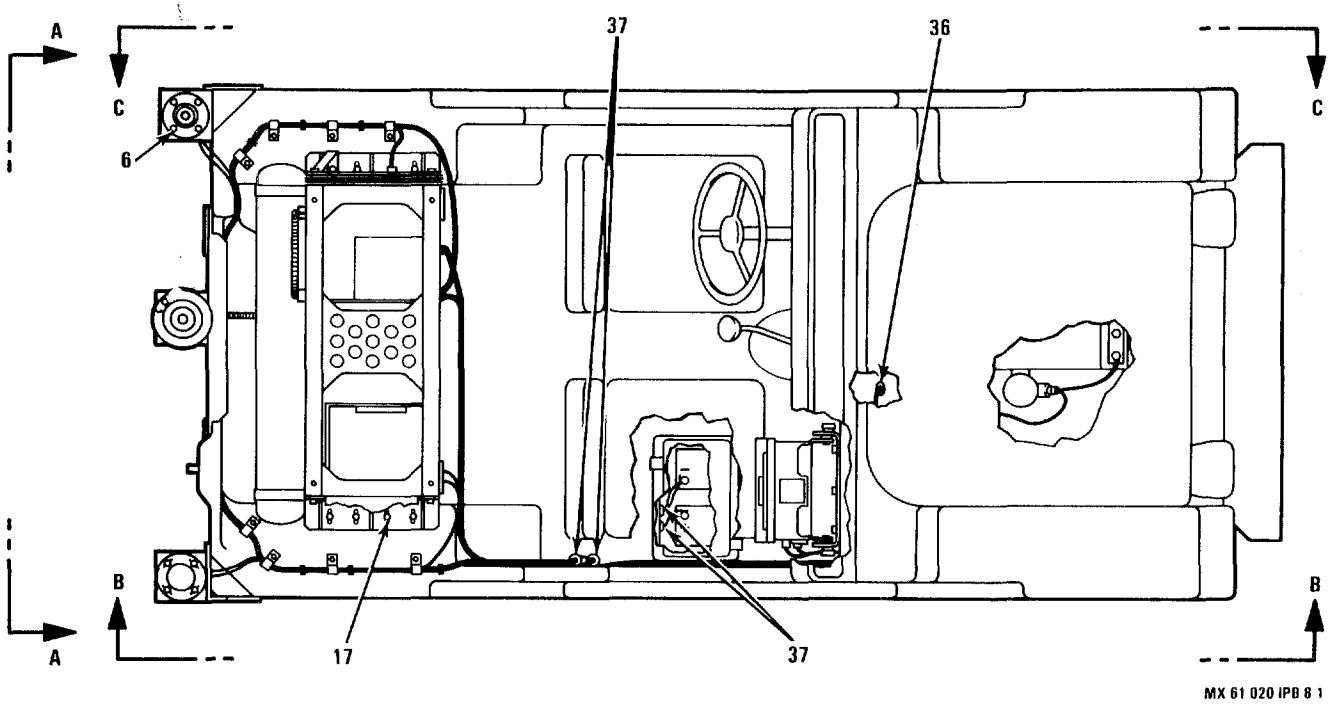
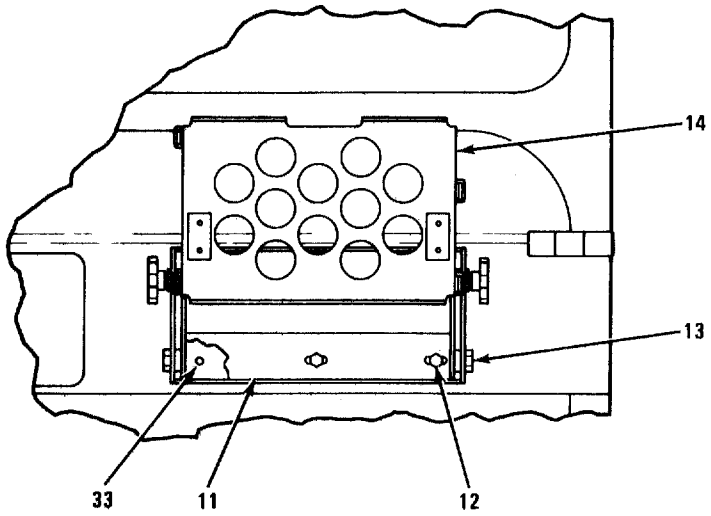
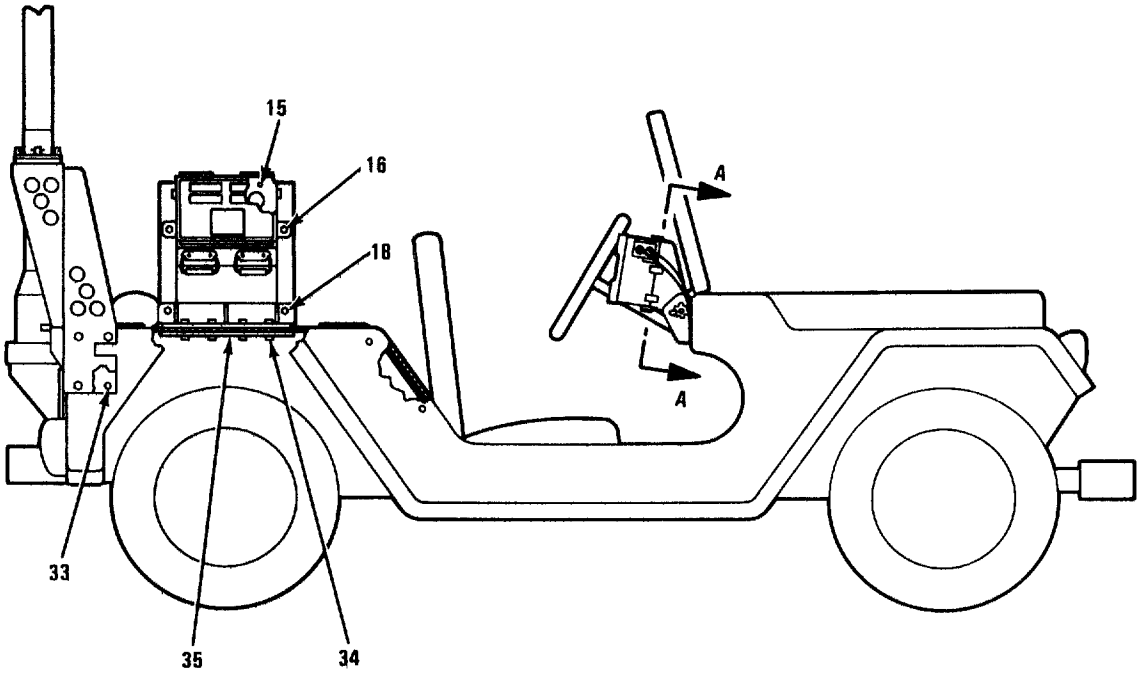


Figure 7-8. Kit Installation (Sheet 1 of 5)



SECTION A-A



VIEW B-B

MX 61 020 IPB 8 2

Figure 7-8. Kit Installation (Sheet 2 of 5)

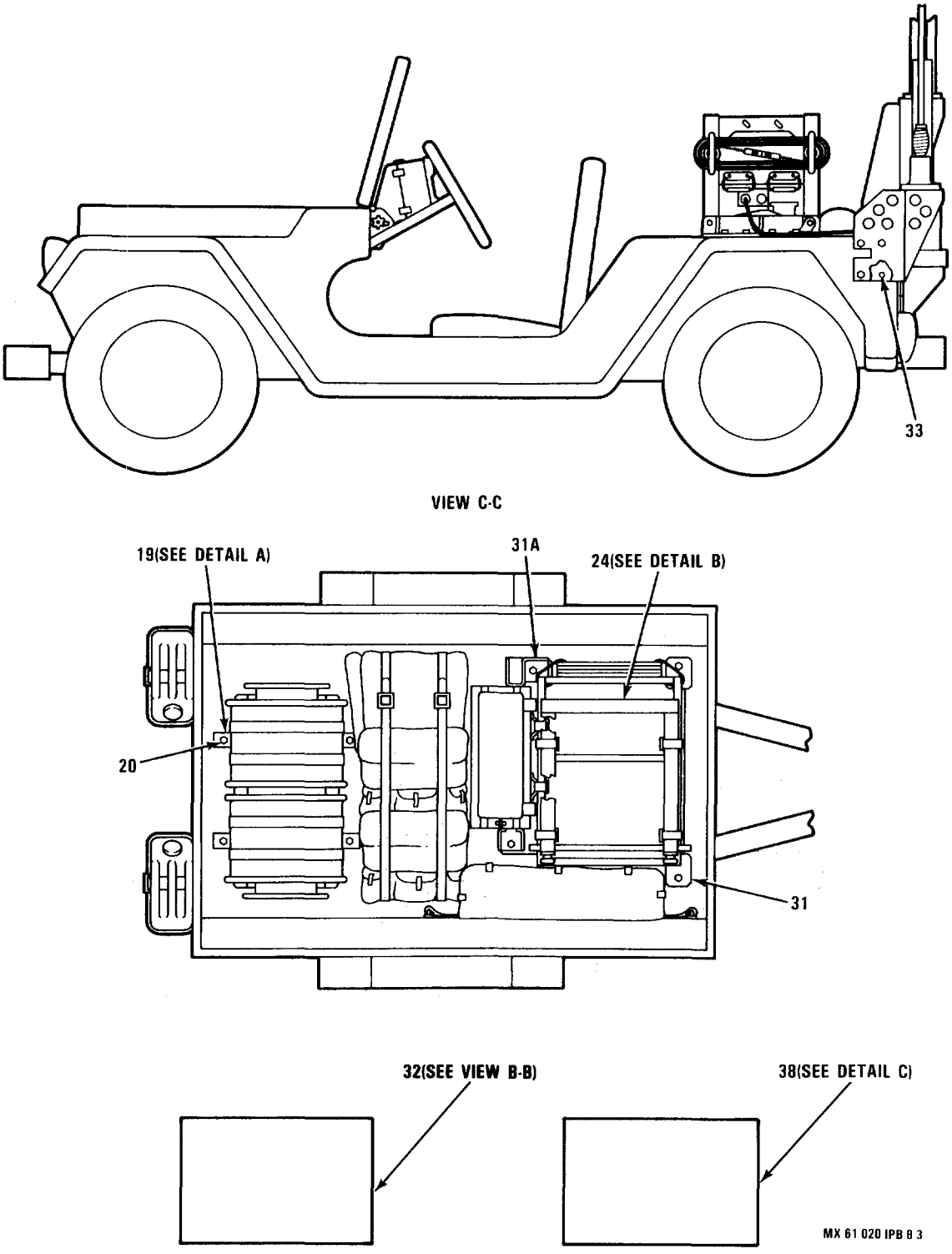


Figure 7-8. Kit Installation (Sheet 3 of 5)

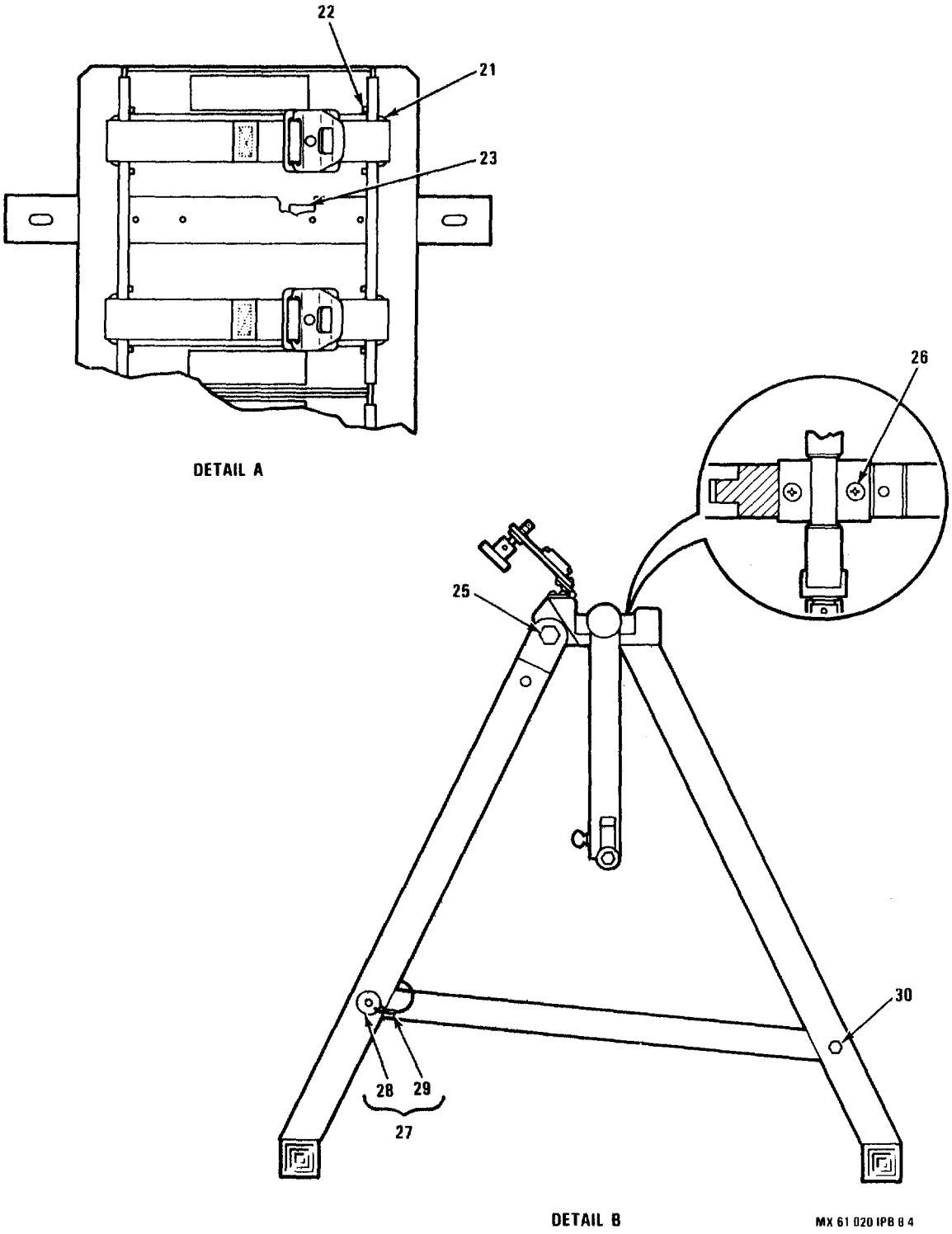


Figure 7-8. Kit Installation (Sheet 4 of 5)

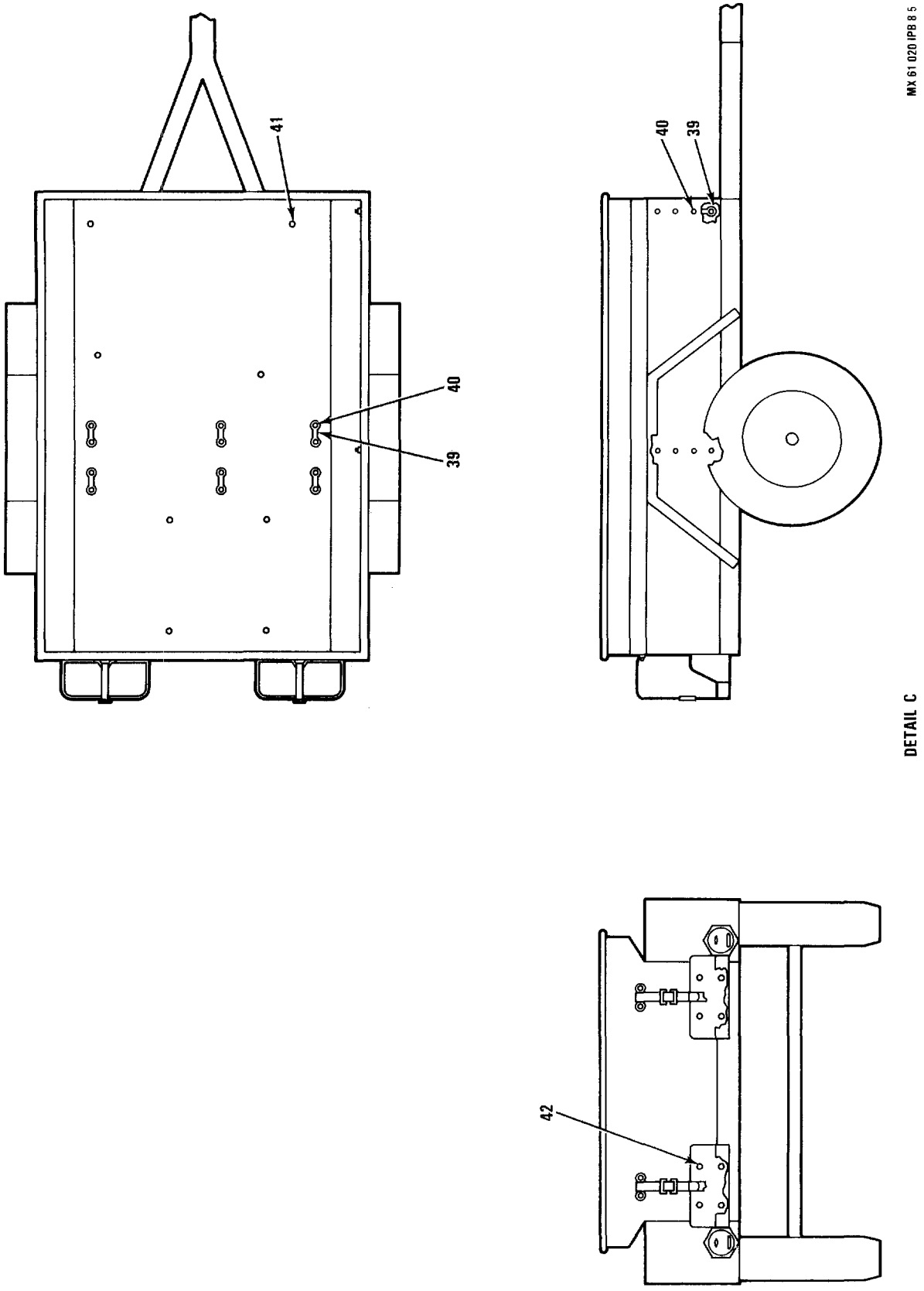


Figure 7-8. Kit Installation (Sheet 5 of 5)

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-6- 28	660154-801	37695	. . CASE, Unified radio set control	1		XB
- 29	SC-B-83314-2 CE O.D.-1 CATCH	98003	. . . CATCH ASSEMBLY ..... (Magnavox spec cont dwg 125249-1)	2		PAFZZ
- 30	MS122118	96906	. . . INSERT	4		PAFZZ
- 31	H-250/U	80058	. HANDSET (GFE)	1		PAOFF
7-7-	812139-801	37695	KIT, Installation (See ..... figure 7-1 for nha)	REF		XB
- 1	812806-801	37695	. BRACKET, Mounting ..... assembly	1		XB
	MS24693C274	96906	. SCREW (AP)	7		PAFZZ
- 2	MS90728-65	96906	. SCREW	3		PAFZZ
	MS338-141	96906	. WASHER	3		PAFZZ
	MS15795-815	96906	. WASHER	3		PAFZZ
	MS51971-3	96906	. NUT	3		PAFZZ
- 3	MS24693C274	96906	. SCREW	7		PAFZZ
- 4	MS35308-414	96906	. SCREW	4		PAFZZ
	MS15795-819	96906	. WASHER	4		PAFZZ
	MS35338-143	96906	. WASHER	4		PAFZZ
7-8-	812134-801	37695	KIT, Installation (See ..... figure 7-1 for nha)	REF		XB
- 1	515023-801	37695	. MOUNT, Antenna	1		XB
- 2	MS35307-336	96906	. SCREW (AP)	12		PAFZZ
	MS35338-140	96906	. WASHER (AP)	12		PAFZZ
	MS15795-813	96906	. WASHER (AP)	12		PAFZZ
- 3	SS37R200	03481	. . NUT, Insert (Magnavox ... spec cont dwg 136568-10)	4		PAFZZ
- 4	515024-801	37695	. MOUNT, Antenna	1		XB
- 5	MS35307-336	96906	. SCREW (AP)	7		PAFZZ
	MS35338-140	96906	. WASHER (AP)	7		PAFZZ
	MS15795-813	96906	. WASHER (AP)	7		PAFZZ
- 6	MS35307-367	96906	. SCREW (AP)	7		PAFZZ
	MS35338-141	96906	. WASHER (AP)	7		PAFZZ
	MS15795-815	96906	. WASHER (AP)	7		PAFZZ
- 7	SS37R200	03481	. . NUT, Insert (Magnavox ... spec cont dwg 136568-10)	4		PAFZZ

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-8-8	515022-801	37695	. MOUNT, Antenna	1		XB
-9	MS35307-366	96906	. SCREW (AP)	8		PAFZZ
	MS35338-140	96906	. WASHER (AP)	8		PAFZZ
	MS15795-813	96906	. WASHER (AP)	8		PAFZZ
-10	SS37R200	03481	. . NUT, Insert (Magnavox spec cont dwg 136568-10)	4		PAFZZ
-11	812805-801	37695	. BRACKET, Mounting assembly	1		XB
-12	MS35307-334	96906	. SCREW (AP)	6		PAFZZ
	MS35338-140	96906	. WASHER (AP)	6		PAFZZ
	MS15795-813	96906	. WASHER (AP)	6		PAFZZ
-13	515154-1	37695	. . SCREW, Shoulder	2		PAFZZ
-14	939421-801	37695	. . BRACKET, Mounting - URSC, M151	1		PAFZZ
-15	MS24693C274	96906	. SCREW	4		PAFZZ
-16	MS90728-60	96906	. SCREW	4		PAFZZ
	MS35338-141	96906	. WASHER	4		PAFZZ
	MS15795-815	96906	. WASHER	4		PAFZZ
	MS51971-3	96906	. NUT	4		PAFZZ
-17	MS35307-365	96906	. SCREW	4		PAFZZ
	MS35338-141	96906	. WASHER	4		PAFZZ
	MS15795-815	96906	. WASHER	4		PAFZZ
-18	MS35307-411	96906	. SCREW	4		PAFZZ
	MS35338-143	96906	. WASHER	4		PAFZZ
	MS15795-819	96906	. WASHER	4		PAFZZ
-19	812100-801	37695	. RACK, Reel	1		XB
-20	MS35307-367	96906	. SCREW (AP)	4		PAFZZ
	MS15795-815	96906	. WASHER (AP)	4		PAFZZ
-21	MS51939-3	96906	. . LOOP STRAP	8		PAFZZ
-22	MS51959-64	96906	. . SCREW (AP)	2		PAFZZ
	MS17830-3C	96906	. . NUT (AP)	2		PAFZZ
-23	MS51957-83	96906	. . SCREW	8		PAFZZ
-24	814445-801	37695	. REELING MACHINE	1		XB
-25	136653-1	37695	. . BOLT, Shouldered	2		PAFZZ
-26	MS51957-83	96906	. . SCREW	4		PAFZZ
	MS35338-139	96906	. . WASHER	4		PAFZZ
	NAS620C416	80205	. . WASHER	4		PAFZZ
-27	814566-801	37695	. . PIN ASSEMBLY, Retaining	2		AFF
-28	MS17984C621	96906	. . . PIN, Quick release	1		PAFZZ
-29	MS51844-62	96906	. . . SLEEVE	1		PAFZZ

FIGURE AND INDEX NUMBER	PART NUMBER	FSCM	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE	SMR CODE
7-8- 30	MS35307-315	96906	. . SCREW	2		PAFZZ
	MS15795-810	96906	. . WASHER	4		PAFZZ
	MS17830-4C	96906	. . NUT	2		PAFZZ
- 31	812127-802	37695	. PLATE ASSEMBLY, Motor ..... generator	1		XB
- 31A	812127-801	37695	. PLATE ASSEMBLY, Motor ..... generator	1		XB
- 32	741421-801	37695	. KIT, Preparation, M151	1		XB
- 33	SS31R125	03481	. . NUT, Insert (Magnavox ... spec cont dwg 136568-5)	33		PAFZZ
- 34	SS37R200	03481	. . NUT, Insert (Magnavox ... spec cont dwg 136568-10)	8		PAFZZ
- 35	939175-1	37695	. . PLATE, Backup	2		PAFZZ
- 36	MS35490-19	96906	. . GROMMET	1		PAFZZ
- 37	MS35489-17	96906	. . GROMMET	4		PAFZZ
- 38	741422-801	37695	. KIT, Preparation, M416	1		XB
- 39	MS51939-3	96906	. . LOOP STRAP	12		PAFZZ
- 40	MS51959-63	96906	. . SCREW (AP)	2		PAFZZ
	MS15795-808	96906	. . WASHER (AP)	2		PAFZZ
	MS17830-3C	96906	. . NUT (AP)	2		PAFZZ
- 41	SS37R200	03481	. . NUT, Insert (Magnavox ... spec cont dwg 136568-10)	8		PAFZZ
	MS35335-65	96906	. . WASHER	8		PAFZZ
- 42	MS35307-358	96906	. . SCREW	8		PAFZZ
	MS15795-814	96906	. . WASHER	4		PAFZZ
	MS17830-6C	96906	. . NUT	4		PAFZZ

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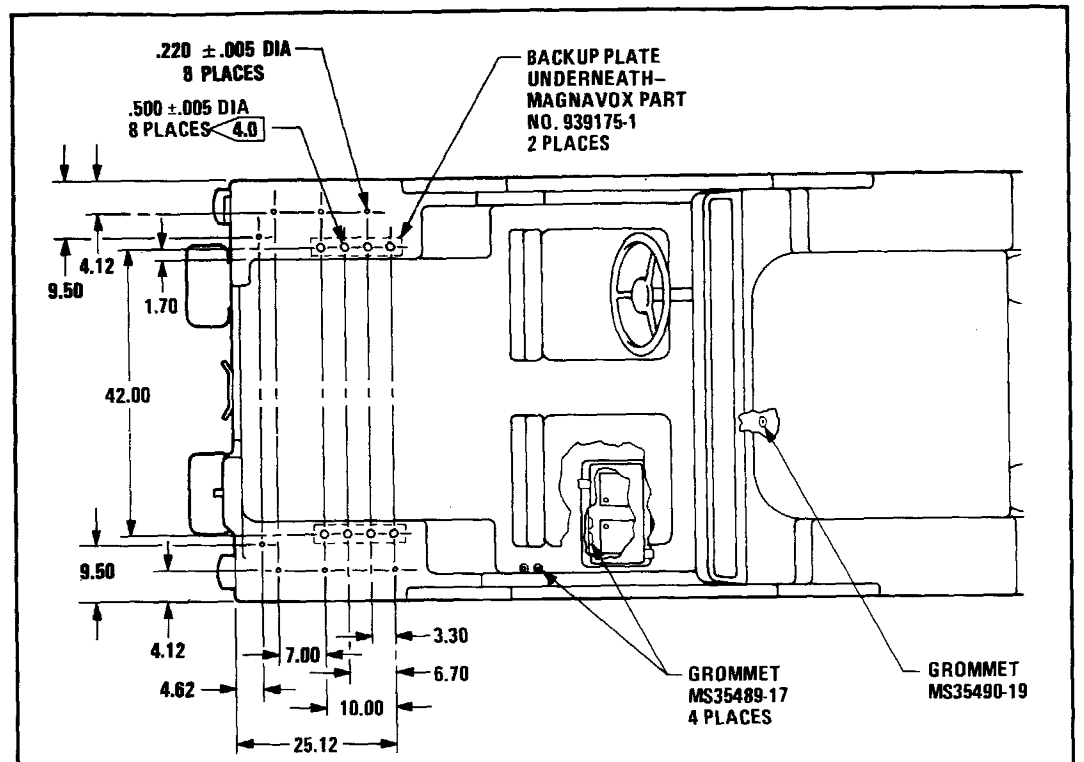
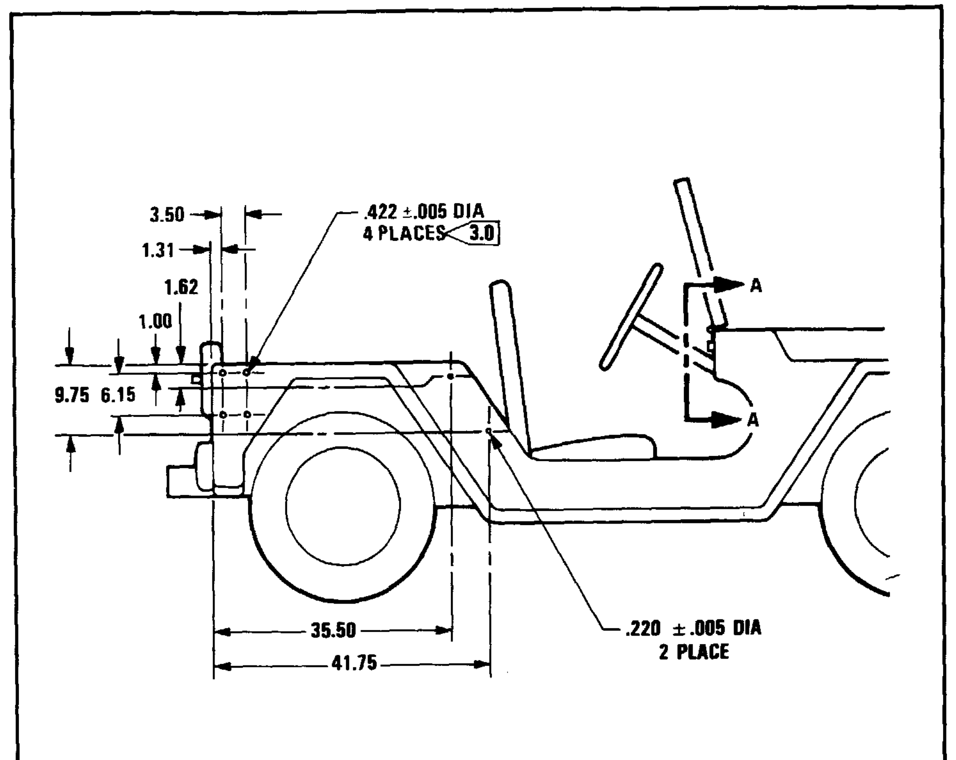


DETAIL Ⓐ – PLAN VIEW, M-151 VEHICLE



DETAIL Ⓑ – CURBSIDE VIEW OF VEHICLE

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

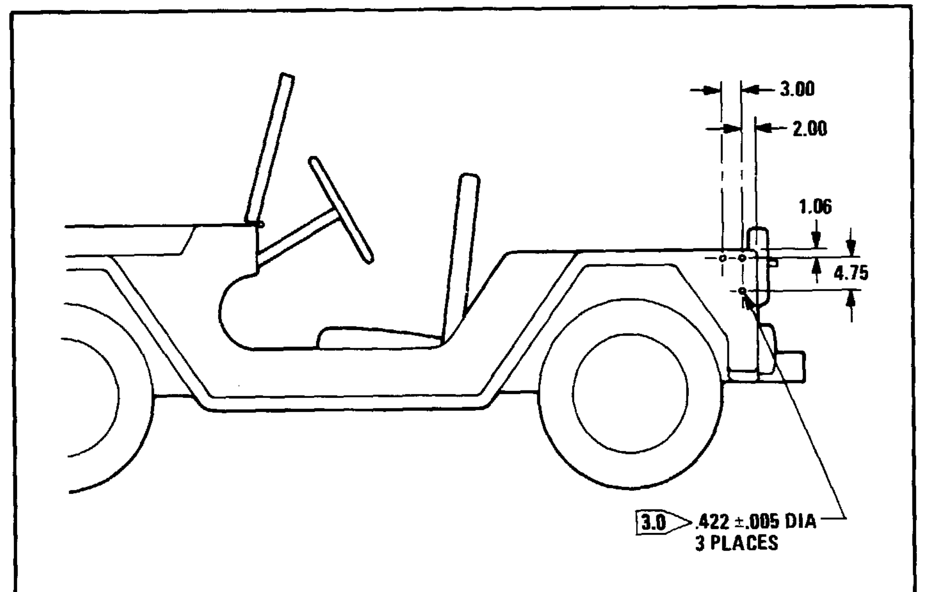
1.2 UNLESS OTHERWISE SPECIFIED, DIMENSIONS, TOLERANCES, AND SURFACE FINISH APPLY AFTER PLATING OR CHEMICAL FILM TREATMENTS, AND PRIOR TO ORGANIC COATINGS.

1.3 DO NOT SCALE DRAWING.

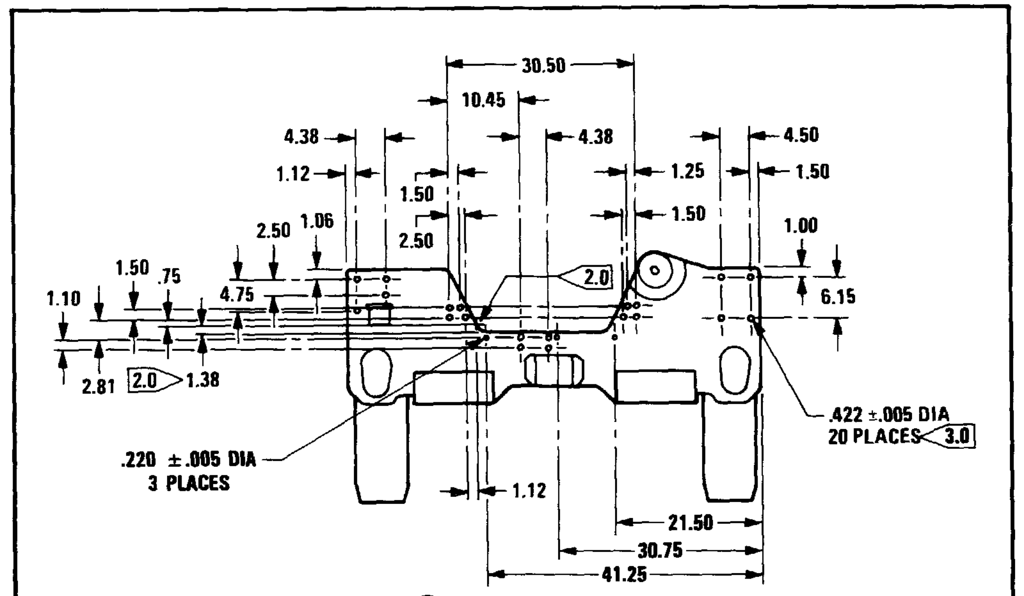
2.0 DATUM POINT IS ESTABLISHED AT GIVEN HEIGHT AND AT EDGE OF REAR WALL.

3.0 INSTALL .312–18UNC X .030/.125 INSERT NUT, MAGNAVOX P/N 136568-5, (03481 SS31R125).

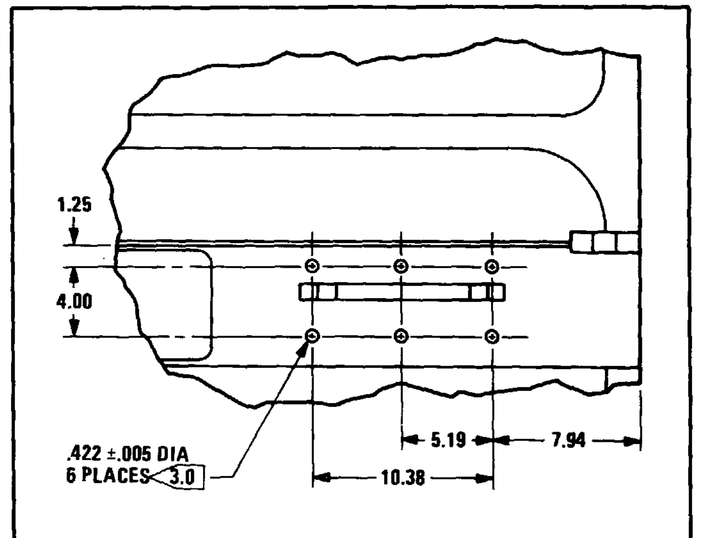
4.0 INSTALL .375–.16UNC X .115/.220 INSERT NUT, MAGNAVOX P/N 136568-10, (03481 SS37R200).



DETAIL Ⓒ – ROADSIDE VIEW OF VEHICLE



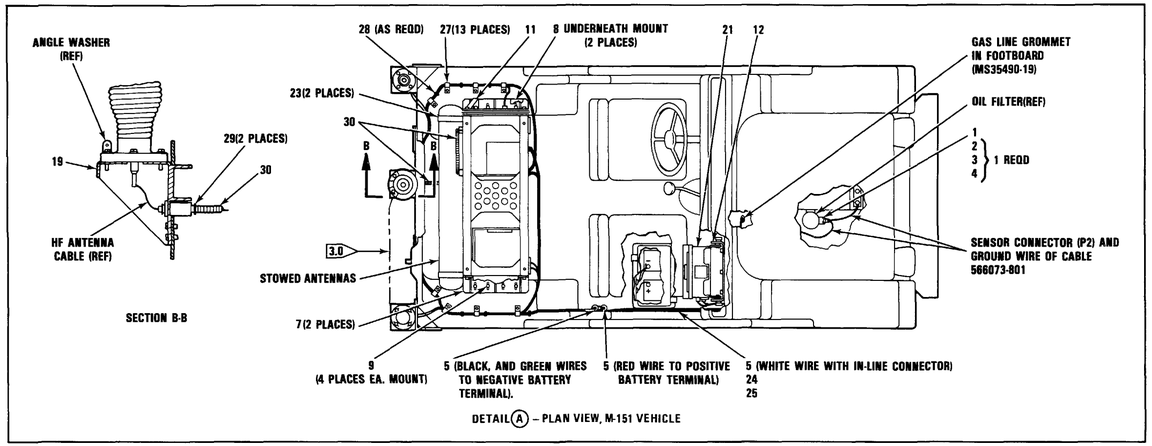
DETAIL Ⓓ – REAR VIEW OF VEHICLE



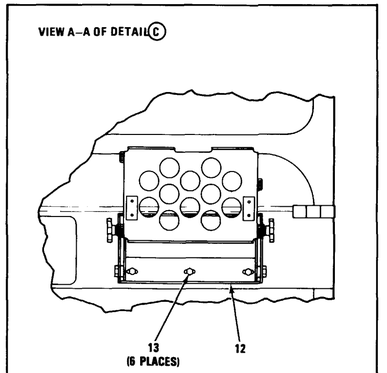
DETAIL Ⓔ – CURBSIDE VIEW A-A OF VEHICLE

MX-61-020-036
REF MX DWG 580487 RF 8 AND MX DWG 741421
200(V)1,(V)2-4-21

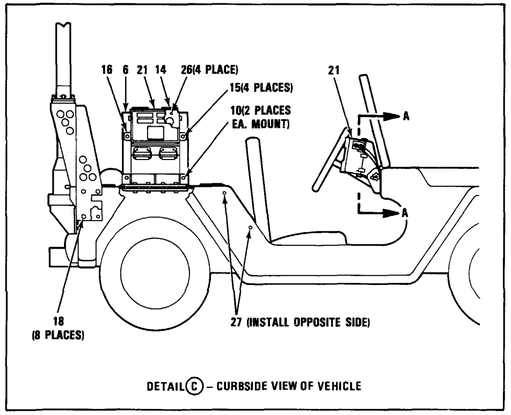
FO-1. M-151 Vehicle Preparation Diagram



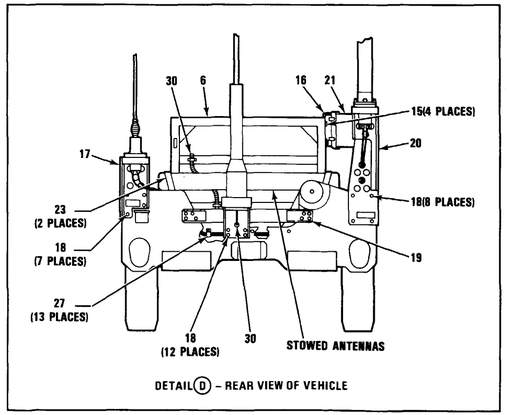
DETAIL (A) – PLAN VIEW, M-151 VEHICLE



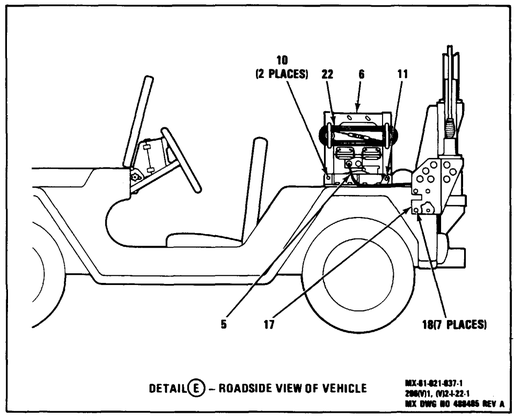
DETAIL (B) – CURBSIDE VIEW A–A OF VEHICLE



DETAIL (C) – CURBSIDE VIEW OF VEHICLE



DETAIL (D) – REAR VIEW OF VEHICLE



FO-2. AN/GRC-206(V), M-151 Vehicle Installation Diagram (Sheet 1 of 2)

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 UNLESS OTHERWISE SPECIFIED, DIMENSIONS, TOLERANCES, AND SURFACE FINISH APPLY AFTER PLATING OR CHEMICAL FILM TREATMENTS, AND PRIOR TO ORGANIC COATINGS.

1.3 DO NOT SCALE DRAWING.

2.0 SEE FIGURE FO-1 FOR MOUNTING HOLE LOCATIONS AND DETAILS..

3.0 REINSTALL SPARE TIRE AFTER AN/GRC-206 INSTALLATION.

4.0 SECURE ALL CABLES WITH ADJUSTABLE CABLE STRAPS.

5.0 AN/GRC-206 WEIGHT INCLUDING KY'S, ANTENNAS AND MOUNTING BRACKETS:

5.1 V1 CONFIGURATION 456.0 LBS MAX

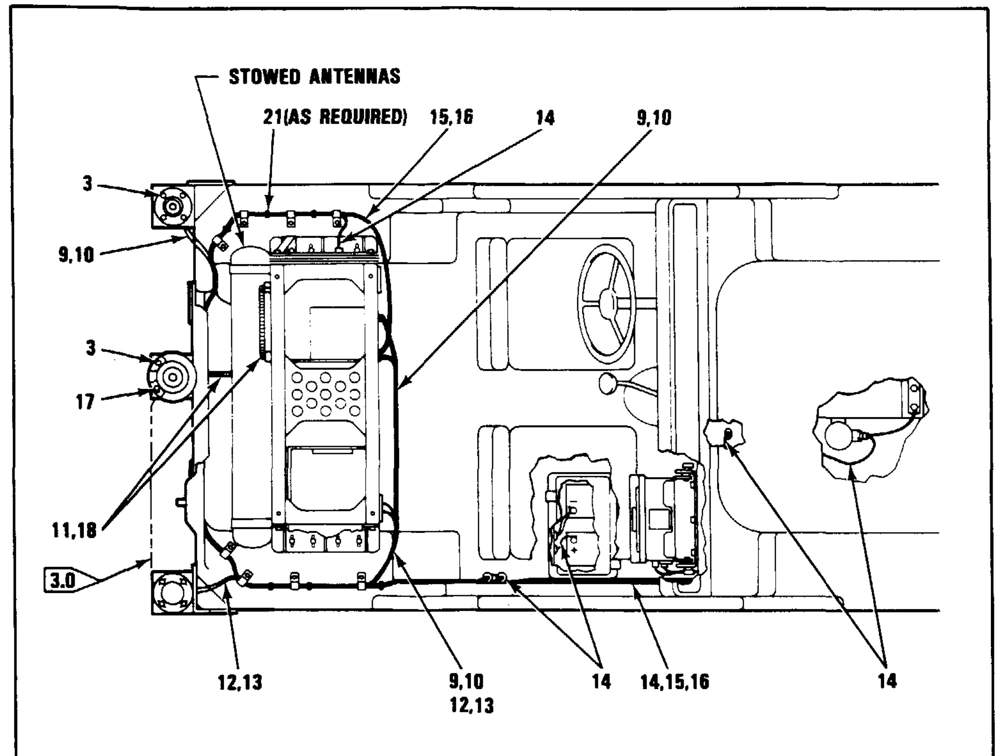
5.2 V2 CONFIGURATION 386.0 LBS MAX

5.3 V3 CONFIGURATION 495.0 LBS MAX

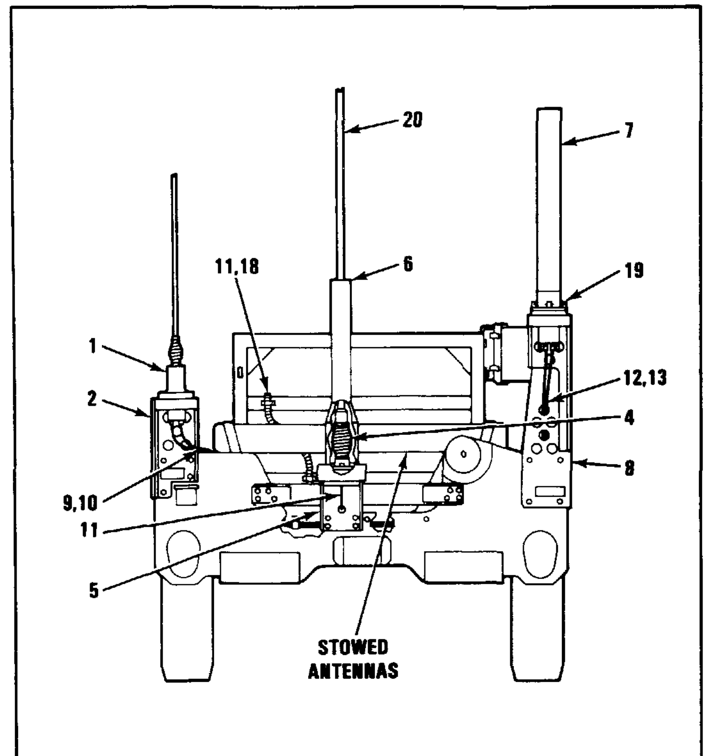
ITEM	DESCRIPTION		
	NAME	SIZE	PART NUMBER
1	Pressure switch		FSN: 5930-00-771-8119
2	Pipe adaptor		MS143061U4
3	Pipe nipple		MS519053-1
4	Pipe plug		WW-P-471AASBCA
5	Input power cable assembly (W1)	12 ft.	MX PN 566073-801
6	Equipment mounting rack (unit 4)		MX PN 8112084-801, -802 or -803
7	Rack mount		MX PN 939176-1
8	Spacer		MX PN 940612-1
9	Rack mount attaching hardware:		
	Bolt	3/8–16 x 1.75	MS35307-365
	Lock washer	3/8	MS35338-141
	Flat washer	3/8	MS15795-815
10	Rack mount attaching hardware:		
	Bolt	1/2–13 x 1.25	MS35307-411
	Lock washer	1/2	MS35338-143
	Flat washer	1/2	MS15795-819
11	Ground Strap		MX PN 567438-801
12	RSC mount		MX PN 812805-801
13	RSC mount attaching hardware:		
	Bolt	5/16-18 x 1.00	MS35307-334
	Lock washer	5/16	MS35338-140
	Flat washer	5/16	MS15795-813
14	RSC mount		MX PN 812806-801
15	RSC mount attaching hardware:		
	Bolt (hardened)	3/8–16 x 1.00	MS90728-60
	Lock washer	3/8	MS35338-141
	Flex washer (2)		MS15795-815
	Hex nut		MS51971-3
16	RSC mounting bracket		MX PN 940823-801
17	VHF-FM antenna mount		MX PN 515024-801
18	Antenna mount attaching hardware:		
	Bolt	5/16–18 x 1.25	MS35307-336
	Lock washer	5/16	MS35338-140
	Flat washer	5/16	MS15795-813
19	HF antenna mount		MX PN 515023-801
20	VHF/UHF antenna mount		MX PN 515022-801
21	RSC		MX PN 812085-801
22	Fiber optic cable (W10, stowed)	50 ft.	MX PN 566080-801
23	Retaining strap		MX PN 405020-1
24	Fiber optic cable (W9)	12 ft.	MX PN 566080-802
25	RSC power cable (W3)	20 ft.	MX PN 566085-807
26	Flat head screw	10-32 x 0.75	MS 24693C274
27	Cable attaching hardware:		
	Loop clamp		MS 21333-12
	Bolt		MS 351958-63
	Nut		MS 21044C3
28	Adjustable cable strap		MX PN 136617-4
29	Spring clamp		MS 39326-8
30	HF cable tube		MX PN 349182-1

MX-81-821-837-2
2GRC01, (V)2-1-22-2

FO-2. AN/GRC-206(V), M-151 Vehicle Installation Diagram (Sheet 2 of 2)



DETAIL (A) – PLAN VIEW, M-151 VEHICLE



DETAIL (B) – REAR VIEW OF VEHICLE

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 UNLESS OTHERWISE SPECIFIED, DIMENSIONS, TOLERANCES, AND SURFACE FINISH APPLY AFTER PLATING OR CHEMICAL FILM TREATMENTS, AND PRIOR TO ORGANIC COATINGS.

1.3 DO NOT SCALE DRAWING.

2.0 SEE FIGURE FO-1 FOR MOUNTING HOLE LOCATIONS AND DETAILS..

3.0 REINSTALL SPARE TIRE AFTER AN/GRC-206 INSTALLATION.

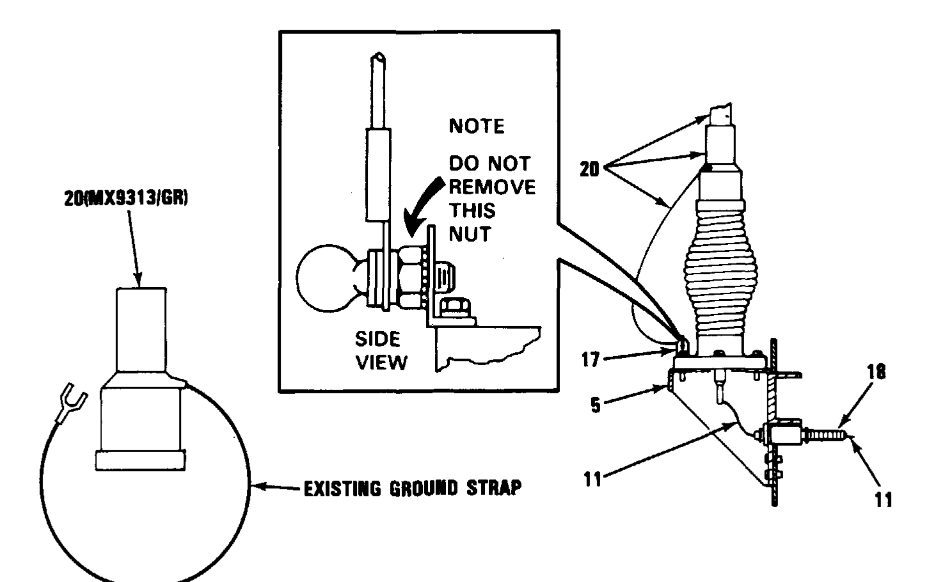
4.0 SECURE ALL CABLES WITH ADJUSTABLE CABLE STRAPS.

5.0 AN/GRC-206 WEIGHT INCLUDING KY'S, ANTENNAS AND MOUNTING BRACKETS:

5.1 V1 CONFIGURATION 456.0 LBS MAX

5.2 V2 CONFIGURATION 386.0 LBS MAX

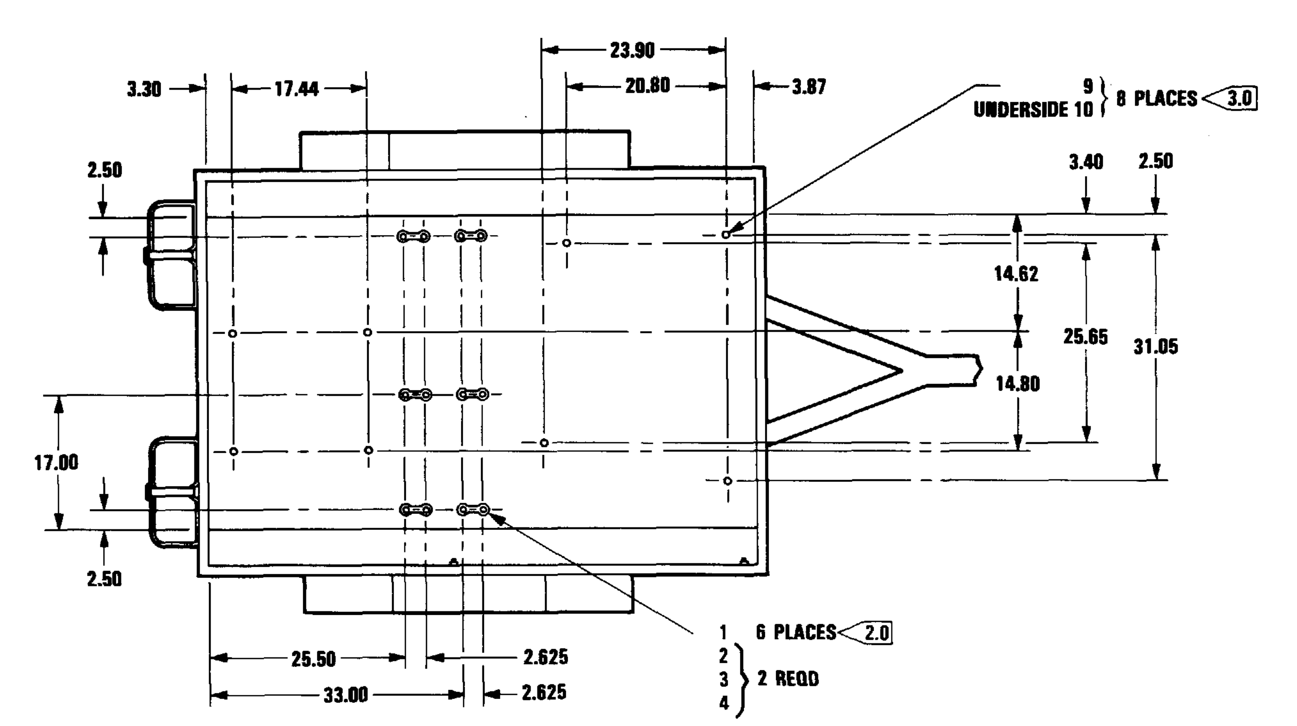
5.3 V3 CONFIGURATION 495.0 LBS MAX



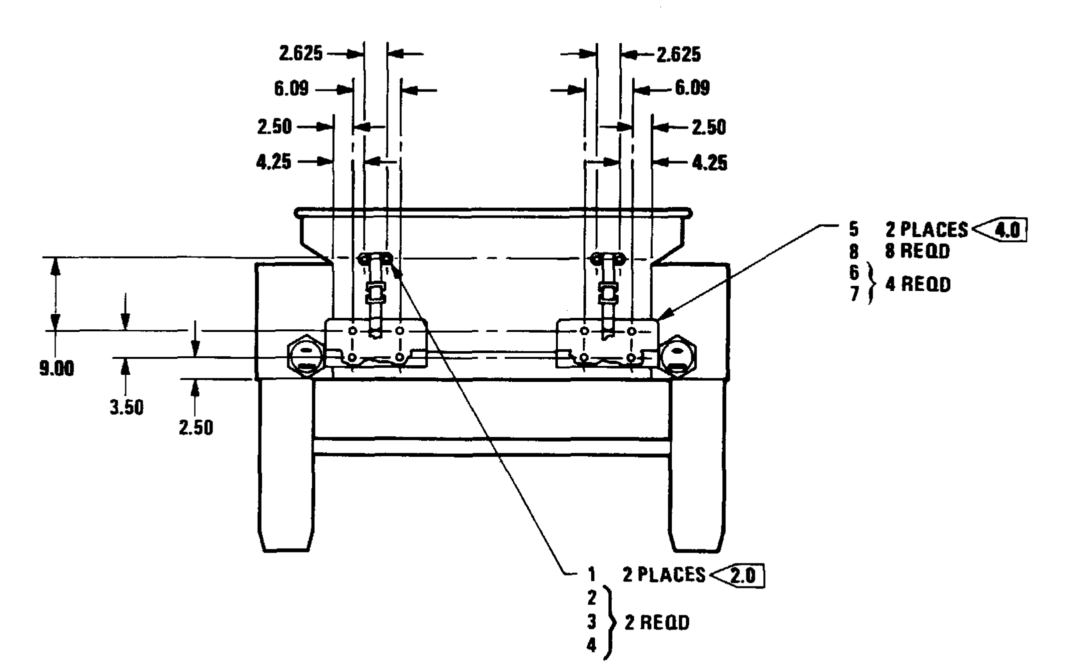
DETAIL (C) - CURBSIDE VIEW OF HF ANTENNA MOUNT

ITEM	DESCRIPTION		
	NAME	SIZE	PART NUMBER
1	VHF-FM antenna (AS-1729/VRC)		NSN: 5985-00-985-9024
2	VHF-FM antenna mount		MX PN 515024-801
3	Antenna base attaching hardware: Bolt Lock washer Flat washer	 3/8–16 x 2.25 3/8 3/8	 MS35307-367 MS35338-141 MS15795-815
4	HF antenna base assembly		MX PN 812069-801
5	HF antenna mount		MX PN 515023-801
6	HF antenna insulator		MX PN 348657-1
7	VHF/UHF-AM antenna		MX PN 626489-1
8	VHF/UHF antenna mount		MX PN 515022-801
9	VHF-FM antenna cable (W7)		MX PN 566078-801
10	VHF-FM antenna control cable (W8)		MX PN 566083-806
11	HF antenna cable (W4)		MX PN 566076-801
12	VHF/UHF antenna cable (W5, UHF)		MX PN 566077-801
13	VHF/UHF antenna cable (W6, VHF)		MX PN 566077-802
14	Input power cable (W1)	12 ft.	MX PN 566073-801
15	Fiber optic cable (W9)	20 ft.	MX PN 566080-802
16	RSC power cable (W3)		MX PN 566085-807
17	Antenna base attaching hardware. Bolt Lock washer Angle washer		 MS 35307-367 MS 35338-141 MX PN 941123-1
18	HF cable tube		MX PN 349182-1
19	Captive screw assembly		MX.PN 515679-801
20	HF (WHIP) antenna (AT-1011) guy wire assembly ALTERNATE: HF (NVIS) antenna (AS-2259/GR) ground strap HF antenna adapter (MX-9313/GR)		NSN: 5985-00-069-6243 MX PN 815425-801 MX PN 626500-1 MX PN 567611-801 MX PN 626500-2
21	Adjustable cable strap		MX PN 136617-4

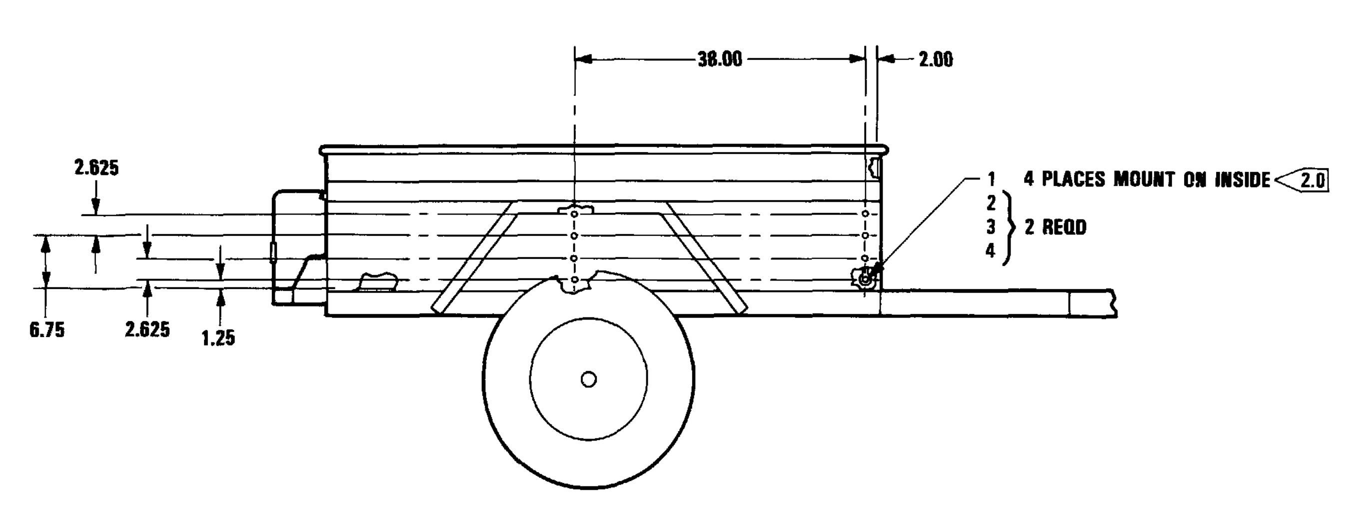
FO-3. AN/GRC-206(V), M-151 Vehicle Antenna Installation Diagram



DETAIL (A) – PLAN VIEW, M-416 TRAILER



DETAIL (B) – REAR VIEW OF TRAILER



DETAIL (C) – CURBSIDE VIEW OF TRAILER

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 UNLESS OTHERWISE SPECIFIED, DIMENSIONS, TOLERANCES, AND SURFACE FINISH APPLY AFTER PLATING OR CHEMICAL FILM TREATMENTS, AND PRIOR TO ORGANIC COATINGS.

1.3 DO NOT SCALE DRAWING.

2.0 ITEM 1 REQUIRES TWO .219 ± .005 DIA HOLES.

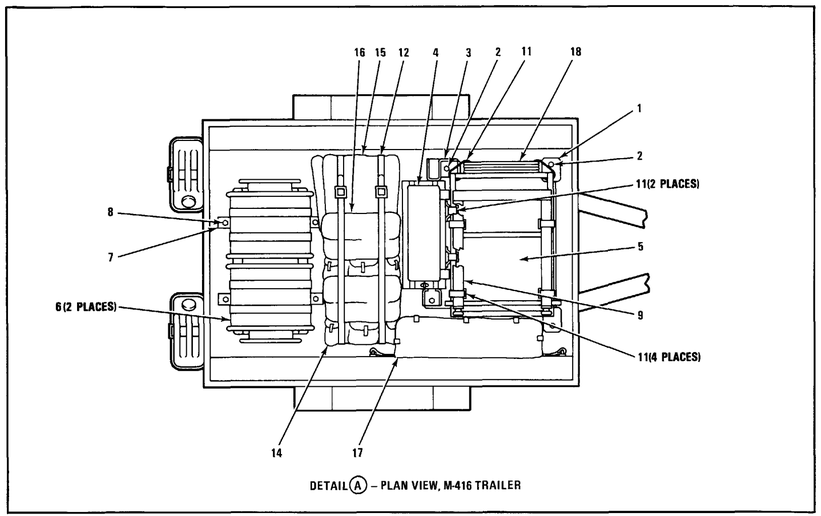
3.0 ITEM 9 REQUIRES A .500 ± .005 DIA HOLES.

4.0 ITEM 5 REQUIRES FOUR .438 ± .005 DIA HOLES.

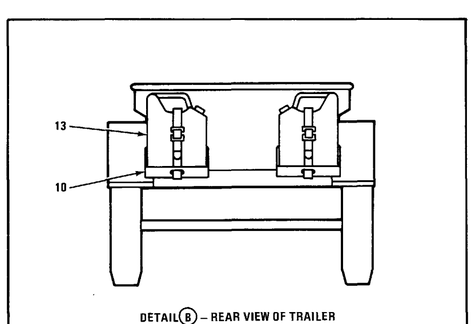
ITEM	DESCRIPTION	
	NAME	PART NUMBER
1	Strap fastener loop	MS51939-3
2	Machine screw	MS51959-63
3	Flat washer	MS15795-808
4	Self-locking nut	MS17830-3C
5	Bracket assembly	MS53052
6	Cap screw	MS35307-358
7	Self-locking nut	MS17830-6C
8	Flat washer	MS15795-814
9	Insert nut (rivnut)	MX PN 136568-10 (03481 SS37R200)
10	Lock washer	MS 35335-65

MX-61-026-038
206(V)1,(V)2-I-24-1,-2
MX DWG NO 586482 REV C, 741422

FO-4. M-416 Trailer Preparation Diagram



DETAIL (A) – PLAN VIEW, M-416 TRAILER



DETAIL (B) – REAR VIEW OF TRAILER

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 UNLESS OTHERWISE SPECIFIED, DIMENSIONS, TOLERANCES, AND SURFACES FINISH APPY AFTER PLATING OR CHEMICAL FILM TREATMENTS, AND PRIOR TO ORGANIC COATINGS.

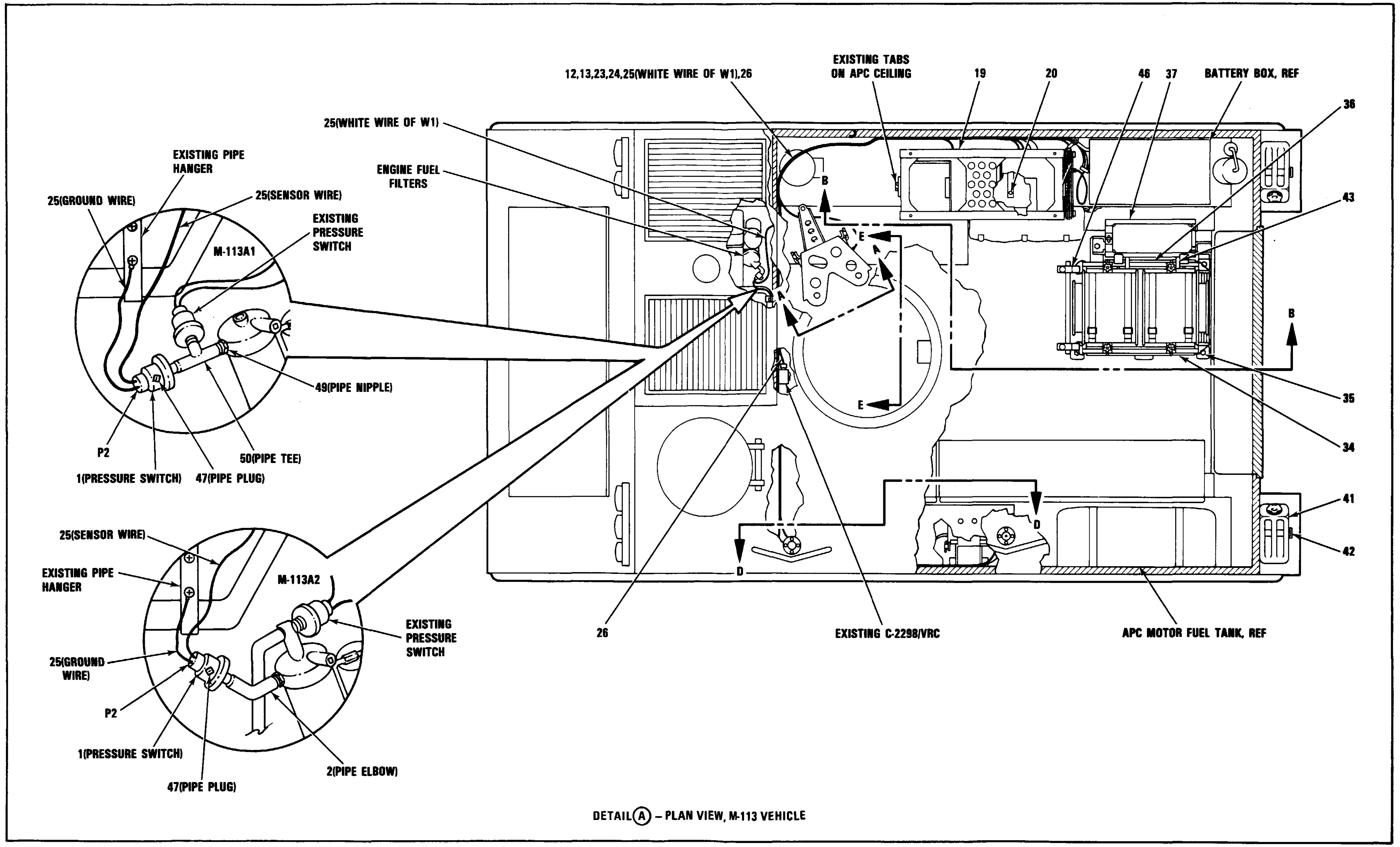
1.3 DO NOT SCALE DRAWING.

2.0 SEE FIGURE FO-4 FOR TRAILER PREPARATION.

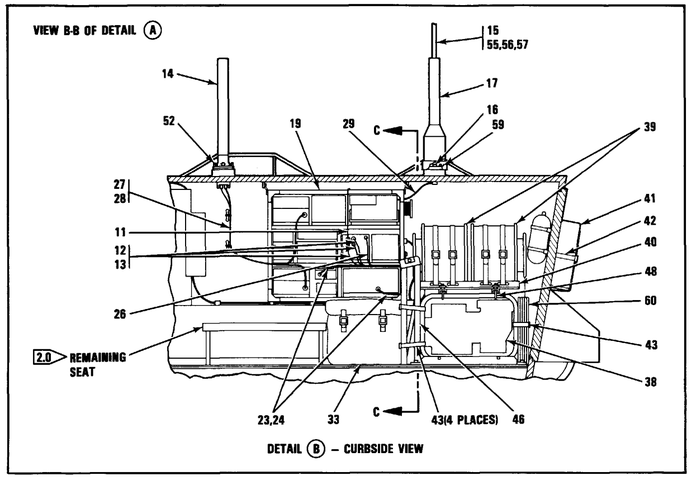
ITEM	DESCRIPTION		
	NAME	SIZE	PART NUMBER
1	Generator mounting rail		MX PN 812127-801
2	Attaching hardware:		
	Bolt	3/8–16 x 2.25	MS35307-367
	Lock washer	3/8	MS35338-141
	Flat washer	3/8	MS15795-815
3	Generator mounting rail		MX PN 812127-802
4	Electrical equipment rack		MX PN 812093-801
5	Auxiliary motor generator		MEP-025 (user supplied)
6	Fiber optic cable (W11) and reel assembly	W11; 1 km each	MX PN 566081-801
7	Reel rack		MX PN 812100-801
8	Attaching hardware:		
	Bolt	3/8–16 x 2.25	MS35307-367
	Flat washer	3/8	MS15795-815
9	Reeling machine		MX PN 814445-801
	2 man reel axle (optional)		MX PN 944137-801
10	Auxiliary fuel tank mounting bracket		MS53052
11	Retaining strap		MX PN 405020-1
12	Retaining strap		MX PN 405020-2
13	Auxiliary fuel tank		MIL-C-1283
14	AN/PRC-104 field pack		User supplied
15	AN/PRC-77 with backpack and accessory bag		User supplied
16	AN/PRC-113 field pack		User supplied
17	Accessory bag		MX PN 812121-1
18	Input power cable (W2)	50 ft.	MX PN 566073-802

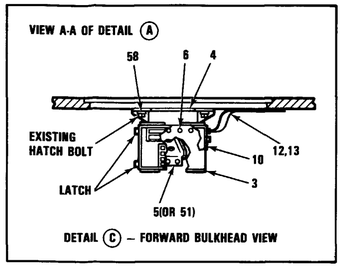
MX-61-020-040A
206(V)1,(V)2-I-25

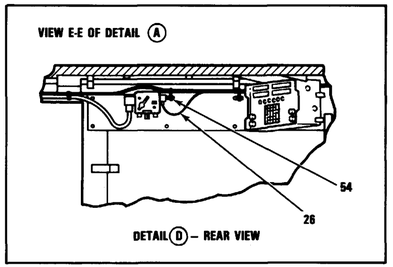
FO-5. AN/GRC-206, M-416 Trailer Installation Diagram

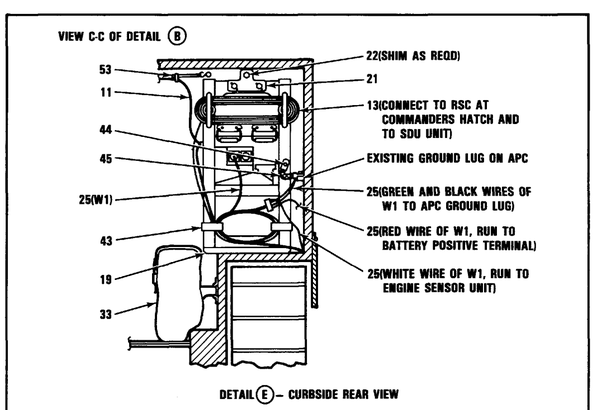

12,13,23,24,25(WHITE WIRE OF W1),26
EXISTING TABS ON APC CEILING
19
20
46
37
BATTERY BOX, REF
36
43
25(WHITE WIRE OF W1)
ENGINE FUEL FILTERS
EXISTING PIPE HANGER
25(GROUND WIRE)
25(SENSOR WIRE)
EXISTING PRESSURE SWITCH
M-113A1
49(PIPE NIPPLE)
P2
50(PIPE TEE)
1(PRESSURE SWITCH)
47(PIPE PLUG)
B
E
A
D
35
34
41
42
25(SENSOR WIRE)
EXISTING PIPE HANGER
M-113A2
EXISTING PRESSURE SWITCH
25(GROUND WIRE)
P2
1(PRESSURE SWITCH)
47(PIPE PLUG)
2(PIPE ELBOW)
26
EXISTING C-2298/VRC
APC MOTOR FUEL TANK, REF
DETAIL (A) – PLAN VIEW, M-113 VEHICLE

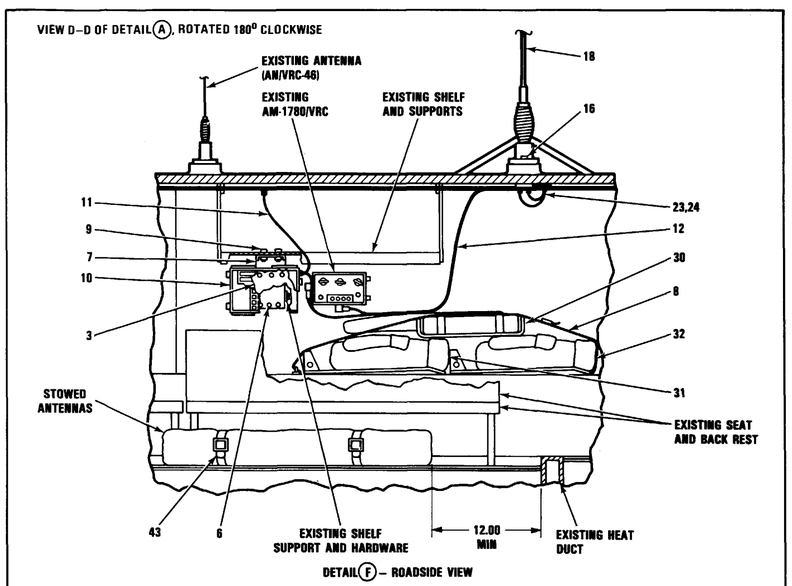
FO-6. AN/GRC-206(V), M-113 Vehicle
Preparation/Installation Diagram
(Sheet 1 of 4)











MIX-81-828-841-2
206(V)1,(V)2-1-26-2

FO-6. AN/GRC-206(V), M-113 Vehicle Preparation/Installation Diagram (Sheet 2 of 4)

ITEM	DESCRIPTION		
	NAME	SIZE	PART NUMBER
1	Pressure switch		NSN:5930-00-771-8119
2	Pipe elbow (For M113A2 only)		MS51952-2
3	RSC mounting bracket		MX PN 812806-801
4	Hanger bracket		MX PN 939452-801
5	Knee brace (For M113A2 only)		MX PN 939451-801
6	Flat head screw	10–32 x 0.75	MS24693C274
7	Hanger bracket		MX PN 940877-801
8	Retaining strap		MX PN 405020-2
9	Attaching hardware: Bolt Lock washer Flat washer Hex nut	 5/16–18 x 1.00 5/16 5/16 5/16–18	 MS35307-334 MS35338-140 MS15795-813 MS51971-2
10	RSC		MX PN 812085-801
11	Fiber optic cable (W9)	20 ft.	MS PN 566080-802
12	RSC power cable (W3)		MX PN 566085-807
13	Fiber optic cable (W10)	50 ft.	MX PN 566080-801
14	VHF/UHF antenna (AS-3588/GRC-206)		MX PN 626489-1
15	HF antenna (AT-1011) Guy wire assembly		NSN: 5985-00-069-6243 MX PN 815425-801
16	Attaching hardware: Bolt Lock washer Flat washer	 3/8–16 x 1.75 3/8 3/8	 MS35307-365 MS35338-141 MS15795-815
17	HF antenna insulator		MX PN 348657-1
18	VHF-FM antenna (AS-1729/VRC)		NSN: 5985-00-985-9024
19	Equipment mounting rack (unit 4)		MX PN 812084-801, -802 or -803
20	Attaching hardware: Bolt (hardened) Lock washer Flat washer	 3/8–16 x 1.0 3/8 3/8	 MS90728-60 MS35338-141 MS15795-815
21	Rack mount		MX PN 939177-1

ITEM	DESCRIPTION		
	NAME	SIZE	PART NUMBER
22	Attaching hardware: Bolt Lock washer Flat washer Hex nut	 3/8–16 x 1.25 3/8 3/8 3/8–16	 MS90728-65 MS35338-141 MS15795-815 MS51971-3
23	VHF-Fm antenna cable (W7)		MX PN 566078-801
24	VHF-FM antenna control cable (W8)		MX PN 566083-806
25	Input power cable (W1)		MX PN 566073-801
26	VIC-1 audio cable (W12)		MX PN 566084-807
27	VHF/UHF antenna cable (W5, UHF)		MX PN 566077-801
28	VHF/UHF antenna cbale (W6, VHF)		MX PN 566077-802
29	HF antenna cable (W4)		MX PN 566076-802
30	AN/PRC-77 with backpack and accessory bag		User supplied
31	AN/PRC-113 with field pack		User supplied
32	AN/PRC-104 with field pack		User supplied
33	Accessory bag		MX PN 812121-1
34	Generator mounting rail		MX PN 812127-801
35	Attching hardware: Bolt Lock washer Flat washer	 1/2–20 x 1.75 3/8 3/8	 MS35308-414 MS35338-143 MS15795-819
36	Generator mounting rail		MX PN 812127-802
37	Electrical equipment rack		MX PN 812093-801
38	Auxiliary motor generator		MEP-025 (user supplied)
39	Fiber optic cables (W11), and reel assembly	1 km each	MX PN 566081-801
40	Reel rack assembly		MX PN 812100-801
41	Auxiliary fuel tanks		MIL-C-1283
42	Retaining strap		MX PN 405018-1
43	Retaining strap		MX PN 405020-1

MX-81-828-841-3
206RV11.IV12-1-28-3

FO-6. AN/GRC-206(V), M-113 Vehicle Preparation/Installation Diagram (Sheet 3 of 4)

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 UNLESS OTHERWISE SPECIFIED, DIMENSIONS, TOLERANCES, AND SURFACE FINISH APPLY AFTER PLATING OR CHEMICAL FILM TREATMENTS, AND PRIOR TO ORGANIC COATINGS.

1.3 DO NOT SCALE DRAWING.

2.0 ALL BACKRESTS AND REAR SECTION OF SEAT ON THIS SIDE MUST BE REMOVED PRIOR TO AN/GRC-206 INSTALLATION.

3.0 SECURE ALL CABLES WITH ADJUSTABLE CABLE STRAPS MX PN 136617-4.

4.0 AN/GRC-206(V) WEIGHT INCLUDING KY'S, ANTENNAS AND MOUNTING BRACKETS:

4.1 V1 CONFIGURATION – 456.0 LBS MAX

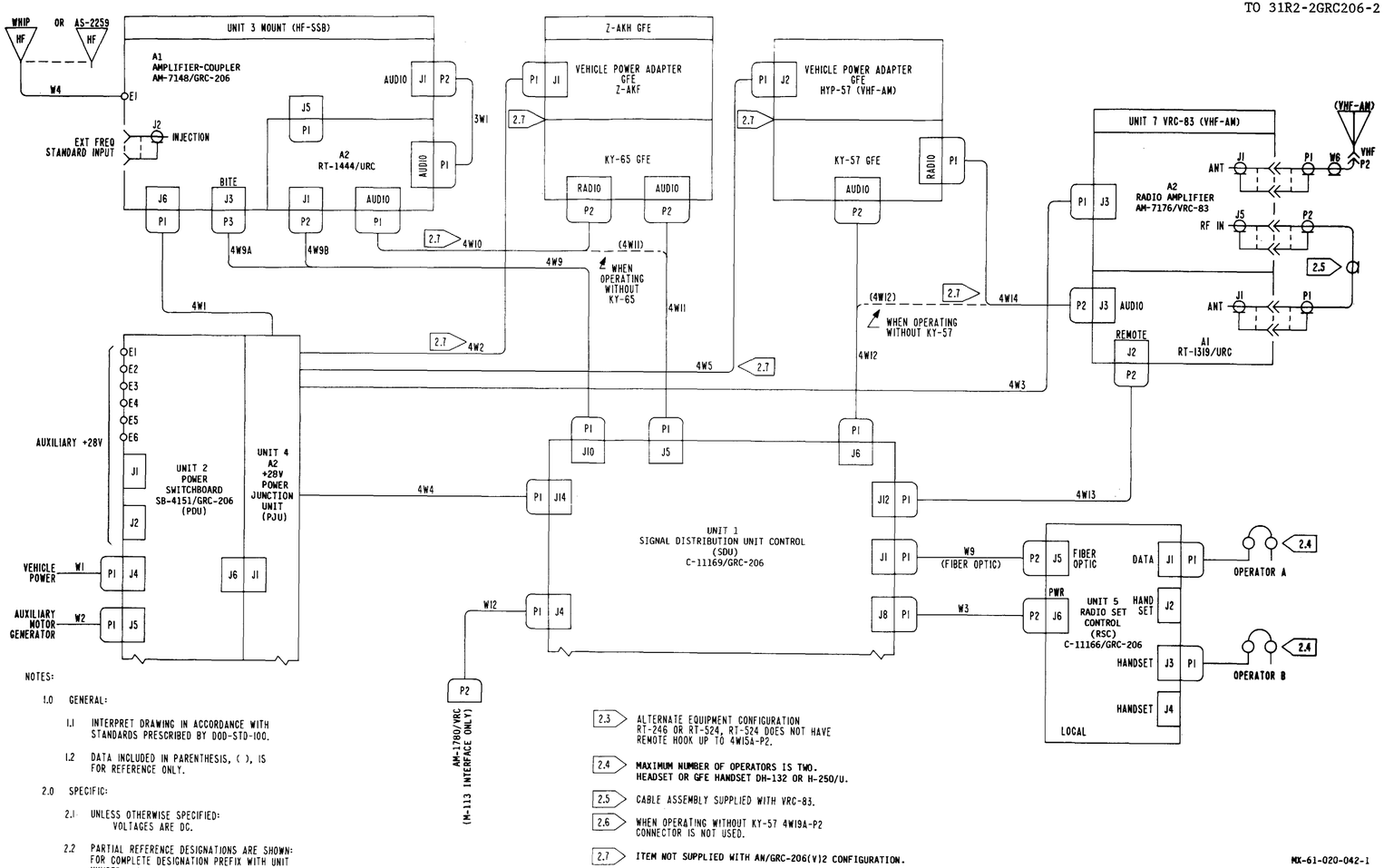
4.2 V2 CONFIGURATION – 386.0 LBS MAX

4.3 V3 CONFIGURATION – 495.0 LBS MAX

ITEM	DESCRIPTION		
	NAME	SIZE	PART NUMBER
44	Attching hardware Bolt Lock washer Flat washer		 MS35307-411 MS35338-143 MS15795-819
45	Ground cable		MX PN 567438-801
46	Reeling machine		MX PN 814445-801
47	Pipe plug		WWP471AASBCA
48	J-Hook assembly		MX PN 815877-801
49	Pipe nipple (For M113A1 only)		MS 51953-29
50	Pipe tee (For M113A1 only)		MS14305-2UA
51	Knee brace (For M113A1 only)		MX PN 941210-801
52	Captive screw assembly		MX PN 515679-801
53	F/O cable mounting strap		MX PN 349139-801
54	Retaining strap		MS51956-1
55	HF(NVIS) antenna (alternate)		MX PN 626500-1
56	Ground strap		MX PN 567611-801
57	HF Antenna adapter		MX PN 626500-2
58	Flat washer		MS15795-823
59	Attaching hardware: Bolt Lock washer Angle washer	 3/8–16 x 1.75 3/8	 MS35307-365 MS35338-141 MX PN 941123-1
60	Input power cable (W2)		MX PN 566073-802

MX-81-829-841-6
206(V)1,(V)2-I-26-3

FO-6. AN/GRC-206(V), M-113 Vehicle Preparation/Installation Diagram (Sheet 4 of 4)



NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 DATA INCLUDED IN PARENTHESIS, ( ), IS FOR REFERENCE ONLY.

2.0 SPECIFIC:

2.1 UNLESS OTHERWISE SPECIFIED: VOLTAGES ARE DC.

2.2 PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER AND SUBASSEMBLY DESIGNATION.

2.3 ALTERNATE EQUIPMENT CONFIGURATION RT-246 OR RT-524, RT-524 DOES NOT HAVE REMOTE HOOK UP TO 4W15A-P2.

2.4 MAXIMUM NUMBER OF OPERATORS IS TWO. HEADSET OR GFE HANDSET DH-132 OR H-250/U.

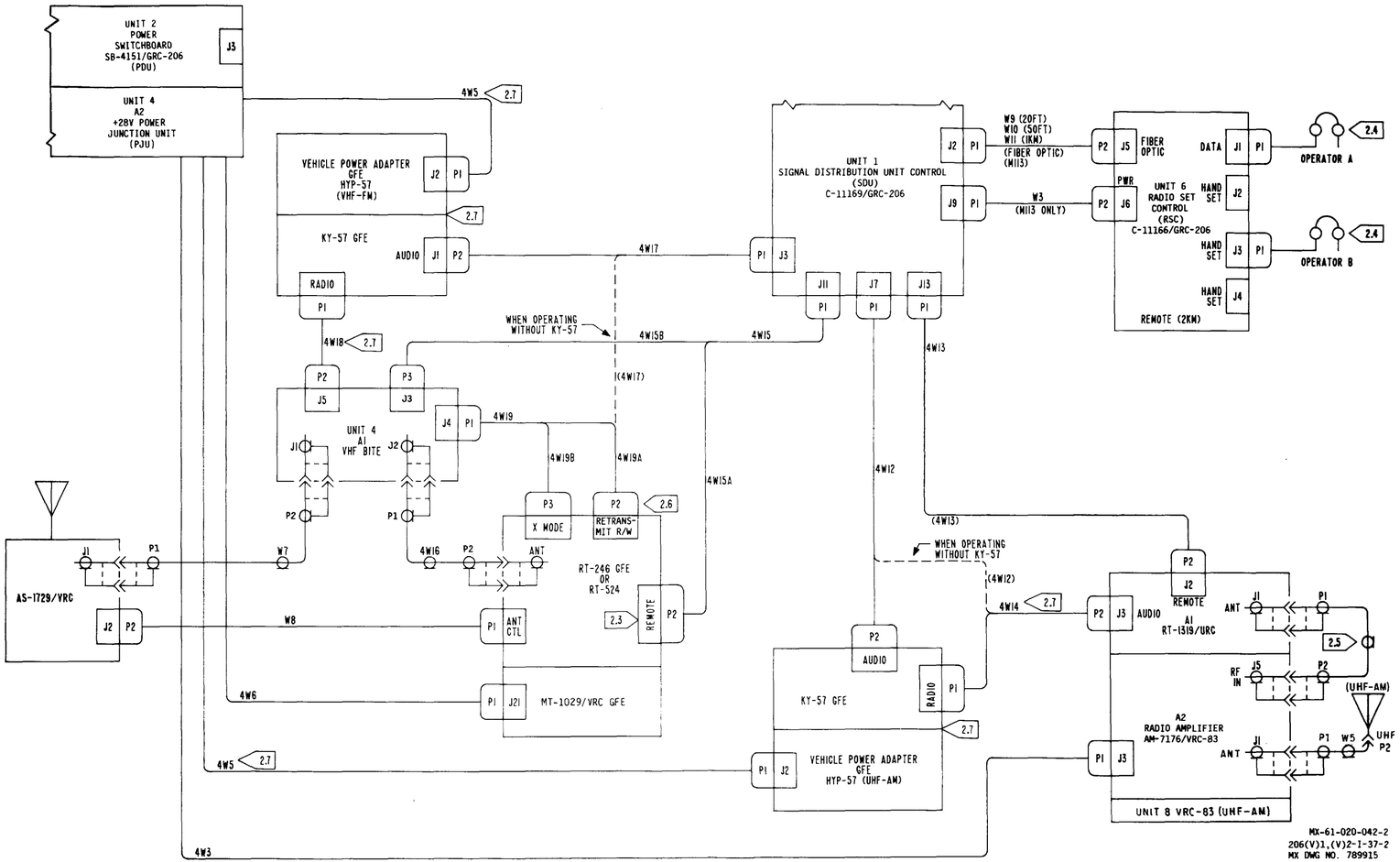
2.5 CABLE ASSEMBLY SUPPLIED WITH VRC-83.

2.6 WHEN OPERATING WITHOUT KY-57 4W19A-P2 CONNECTOR IS NOT USED.

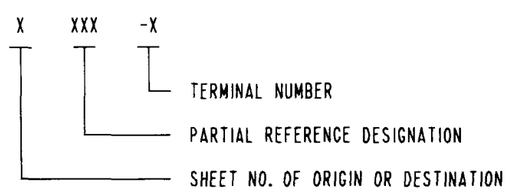
2.7 ITEM NOT SUPPLIED WITH AN/GRC-206(V)2 CONFIGURATION.

MX-61-020-042-1
206(V)1,(V)2-1-37-1
MX DWG NO. 789915

FO-7. Radio System Cabling Diagram (Sheet 1 of 2)



FO-7. Radio System Cabling Diagram
(Sheet 2 of 2)



TYPICAL CIRCUIT CONTINUATION CODE

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 DATA INCLUDED IN PARENTHESIS, ( ), IS FOR REFERENCE ONLY.

1.3 A NUMBER SIGN (#) FOLLOWING A SIGNAL NAME MEANS THE INVERTED (NOT) FORM OF THE SIGNAL.

1.4 CHARACTERS UNDERLINED DENOTE LOWER CASE.

2.0 SPECIFIC:

2.1 UNLESS OTHERWISE SPECIFIED: VOLTAGES ARE DC.

2.2 PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER AND SUBASSEMBLY DESIGNATION.

2.3 ALTERNATE EQUIPMENT CONFIGURATION RT-246 OR RT-524, RT-524 DOES NOT HAVE REMOTE HOOK UP TO 4W15A-P2.

2.4 **MAXIMUM NUMBER OF OPERATORS IS TWO. HEADSET OR GFE HANDSET DH-132 OR H-250/U.**

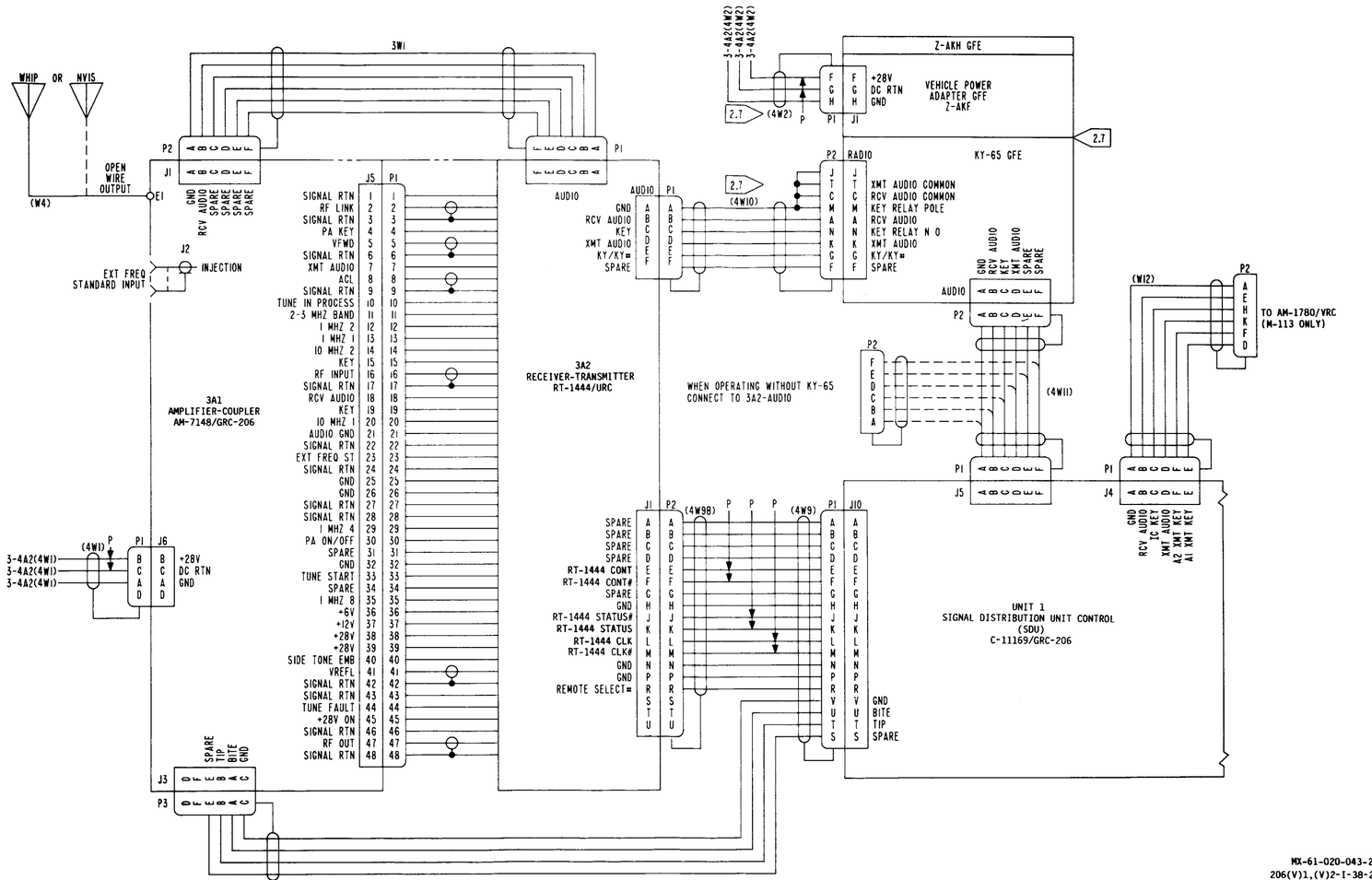
2.5 CABLE ASSEMBLY SUPPLIED WITH VRC-83.

2.6 WHEN OPERATING WITHOUT KY-57 4W19A-P2 CONNECTOR IS NOT USED.

2.7 **ITEM NOT SUPPLIED WITH AN/GRC-206(V)2 CONFIGURATION.**

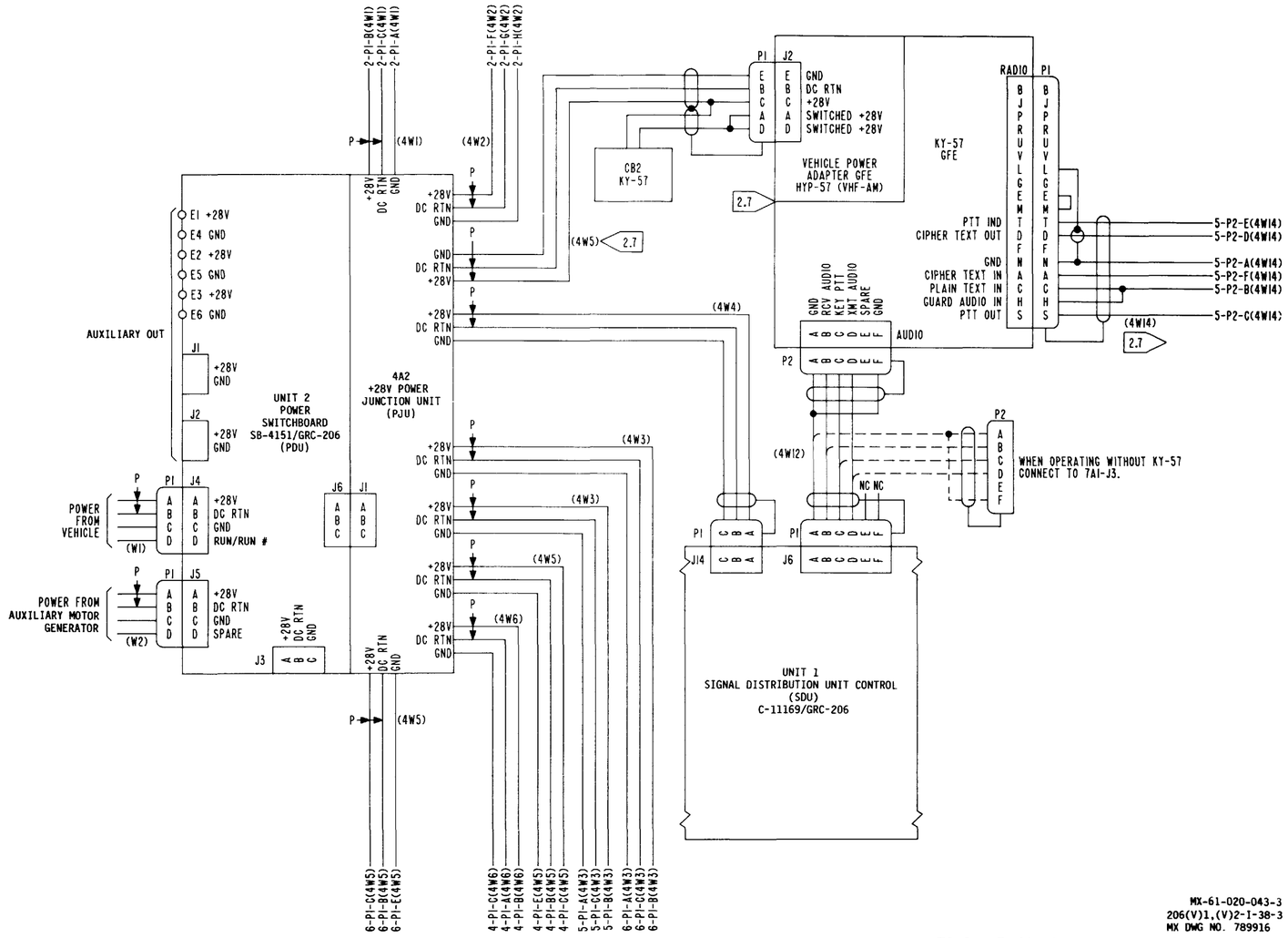
MX-61-020-043-1
206(V)1,(V)2-I-38-1
MX DWG NO. 789916

FO-8. Radio System Wiring Diagram
(Sheet 1 of 7)



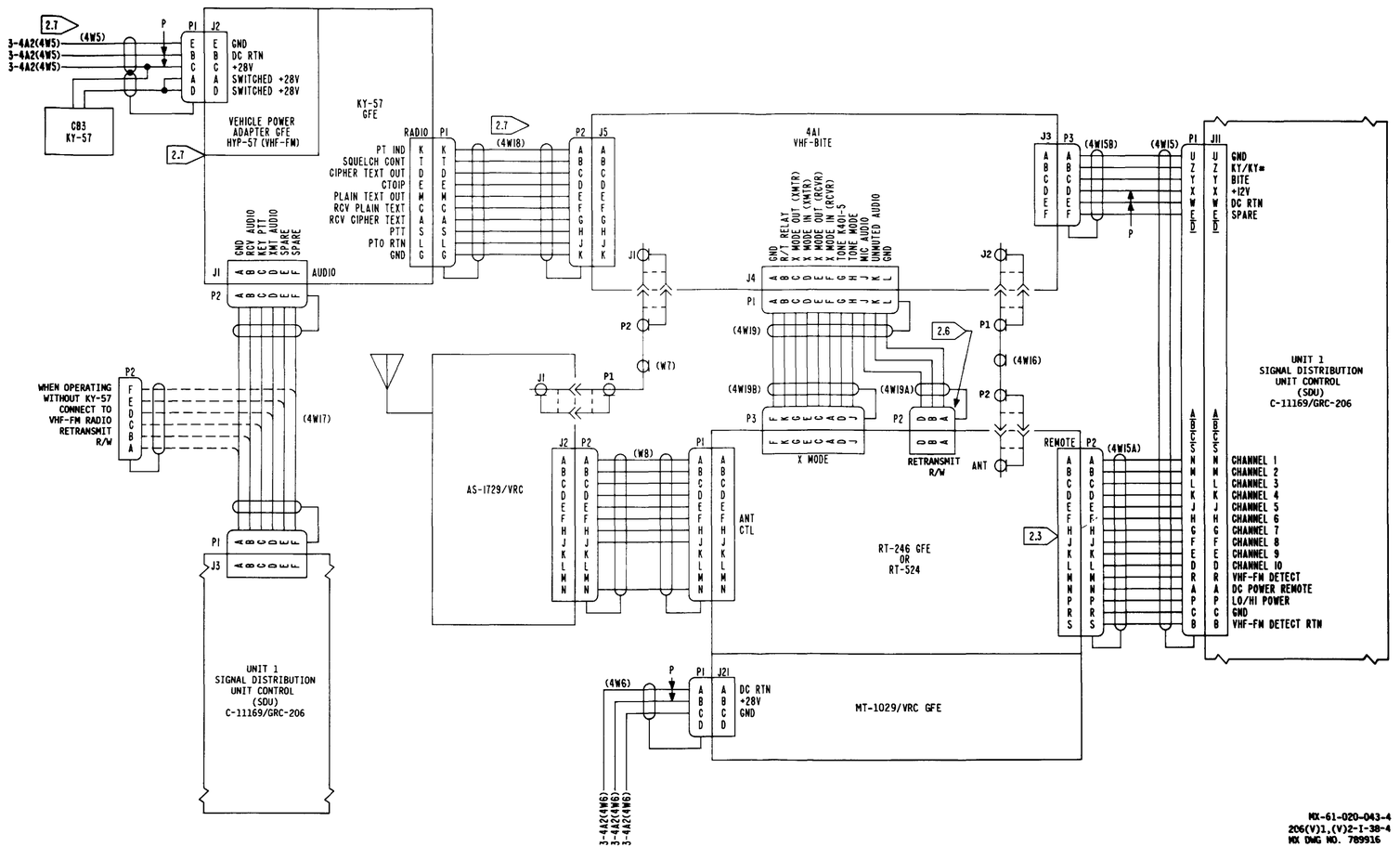
MX-61-020-043-2
206(V)1,(V)2-I-38-2
MX DWG NO. 789916

FO-8. Radio System Wiring Diagram (Sheet 2 of 7)

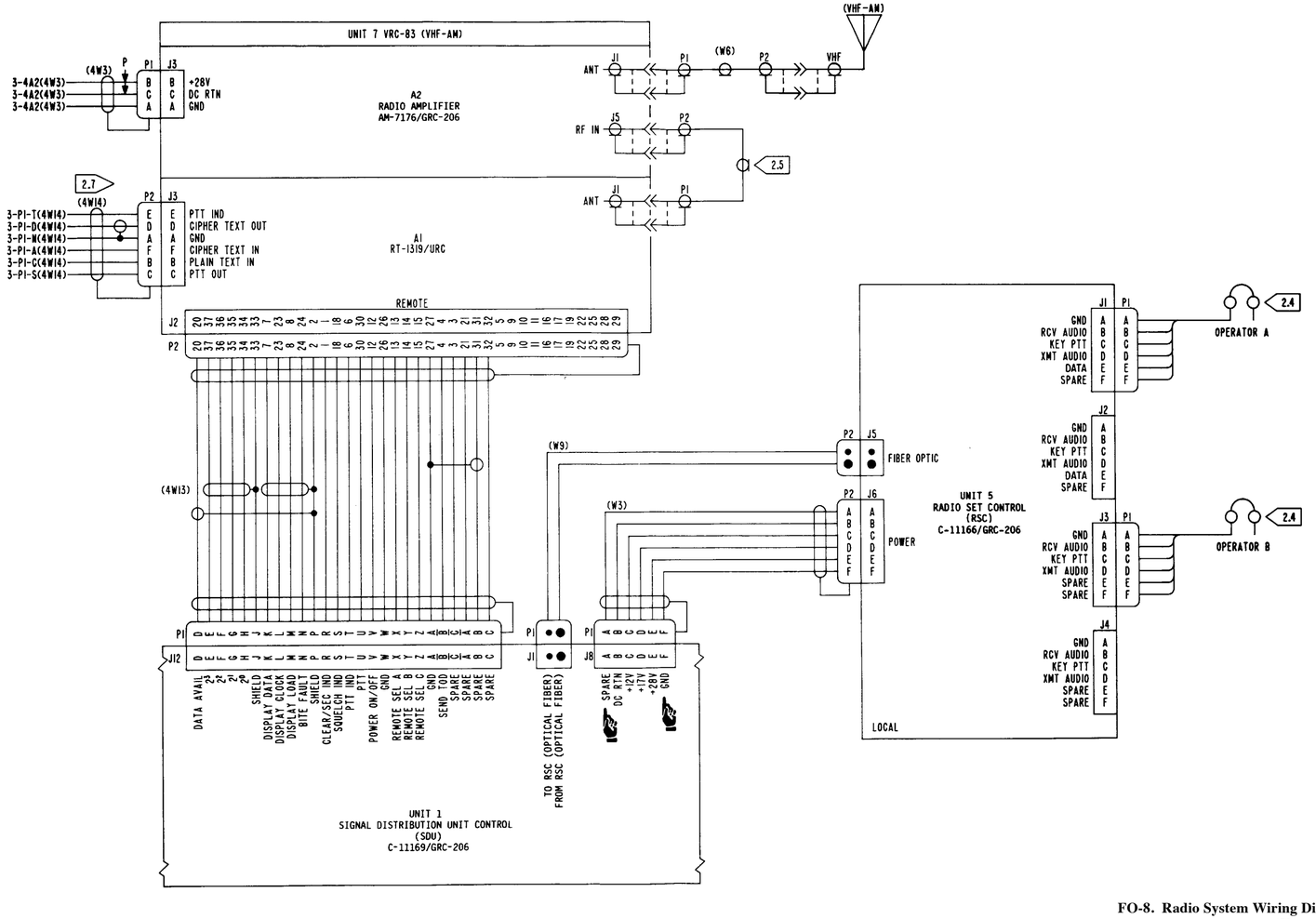


MX-61-020-043-3
206(V)1,(V)2-1-38-3
MX DWG NO. 789916

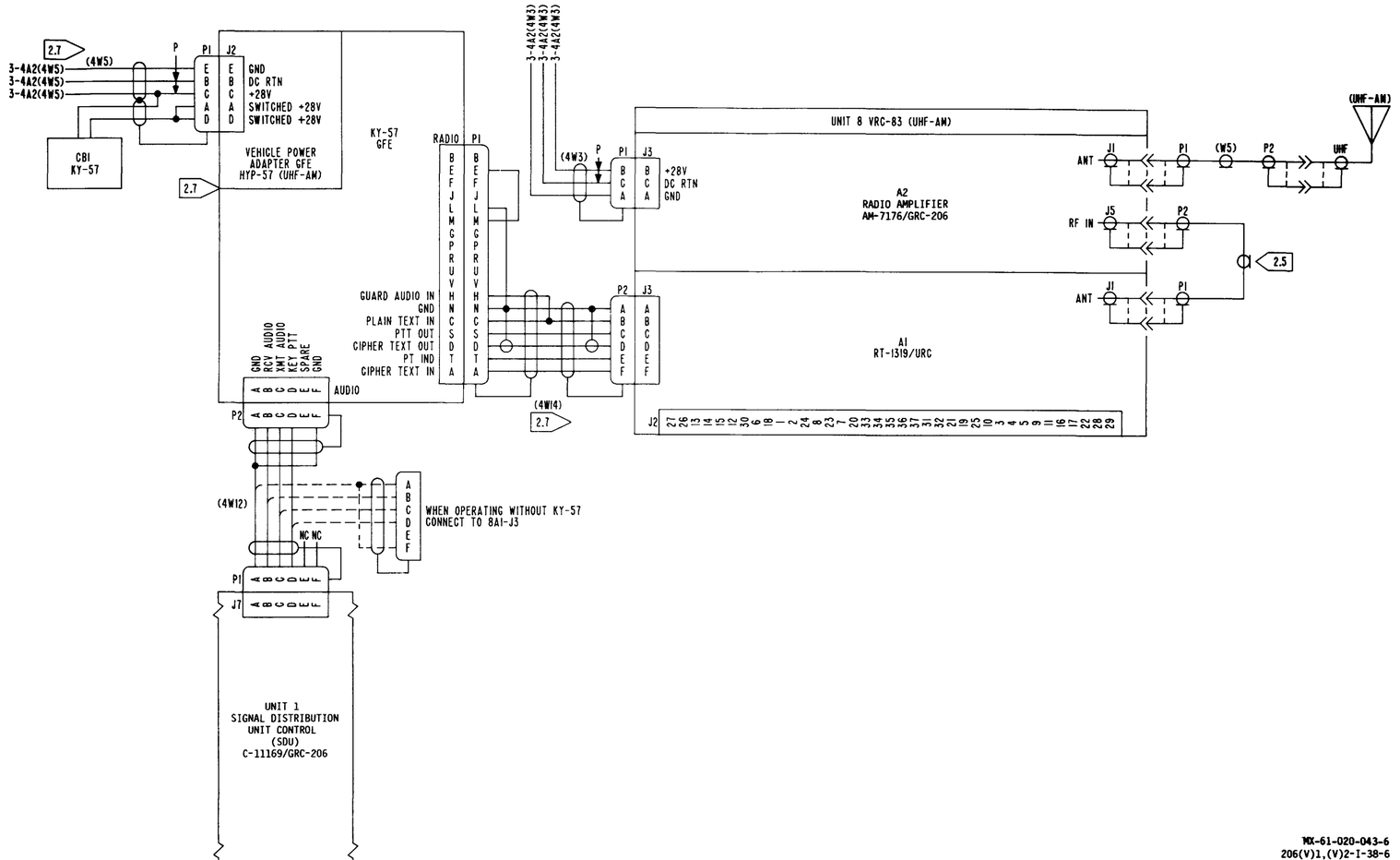
FO-8. Radio System Wiring Diagram
(Sheet 3 of 7)



FO-8. Radio System Wiring Diagram
(Sheet 4 of 7)

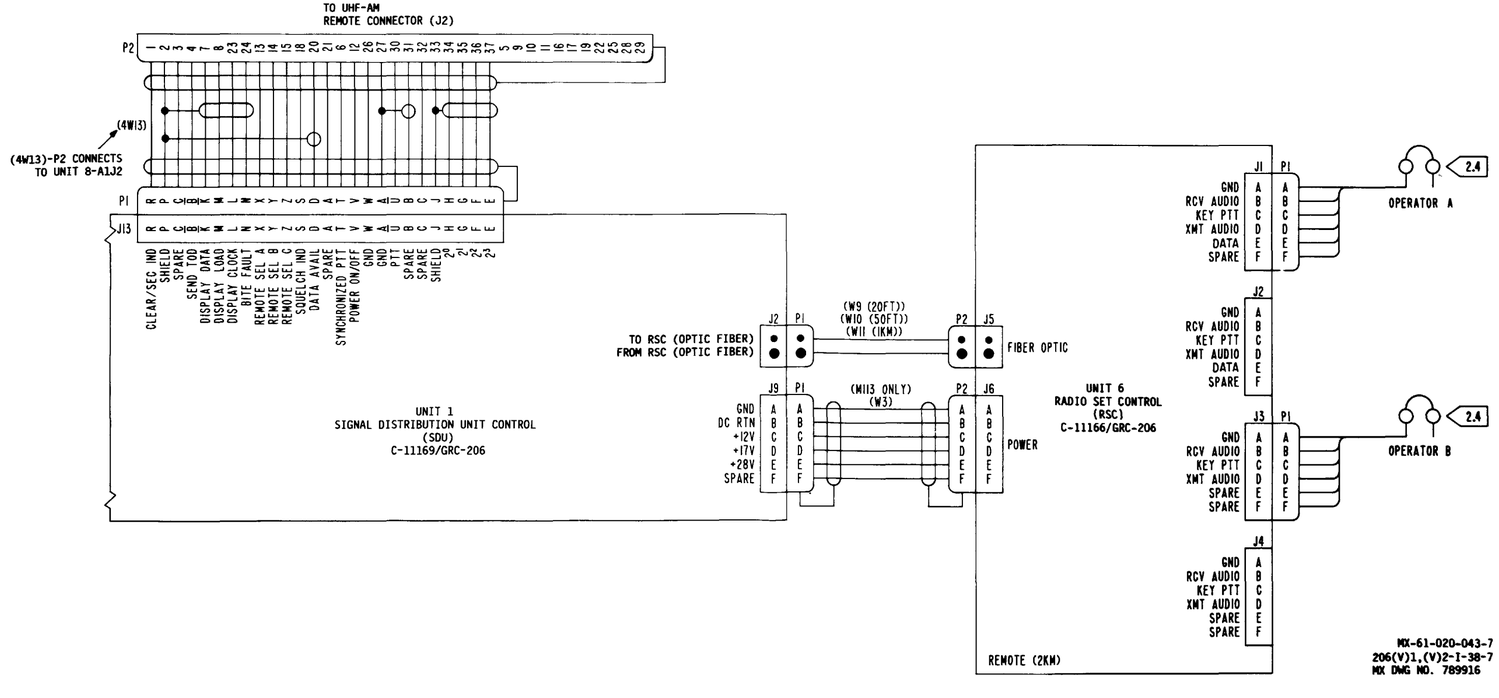


FO-8. Radio System Wiring Diagram
(Sheet 5 of 7)



MX-61-020-043-6
206(V)1,(V)2-I-38-6
MX DWG NO. 789916

FO-8. Radio System Wiring Diagram (Sheet 6 of 7)



FO-8. Radio System Wiring Diagram
(Sheet 7 of 7)

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 DATA INCLUDED IN PARENTHESIS, ( ), IS FOR REFERENCE ONLY.

1.3 A NUMBER SIGN (#) FOLLOWING A SIGNAL NAME MEANS THE INVERTED (NOT) FORM OF THE SIGNAL.

1.4 CHARACTERS UNDERLINED DENOTE LOWER CASE.

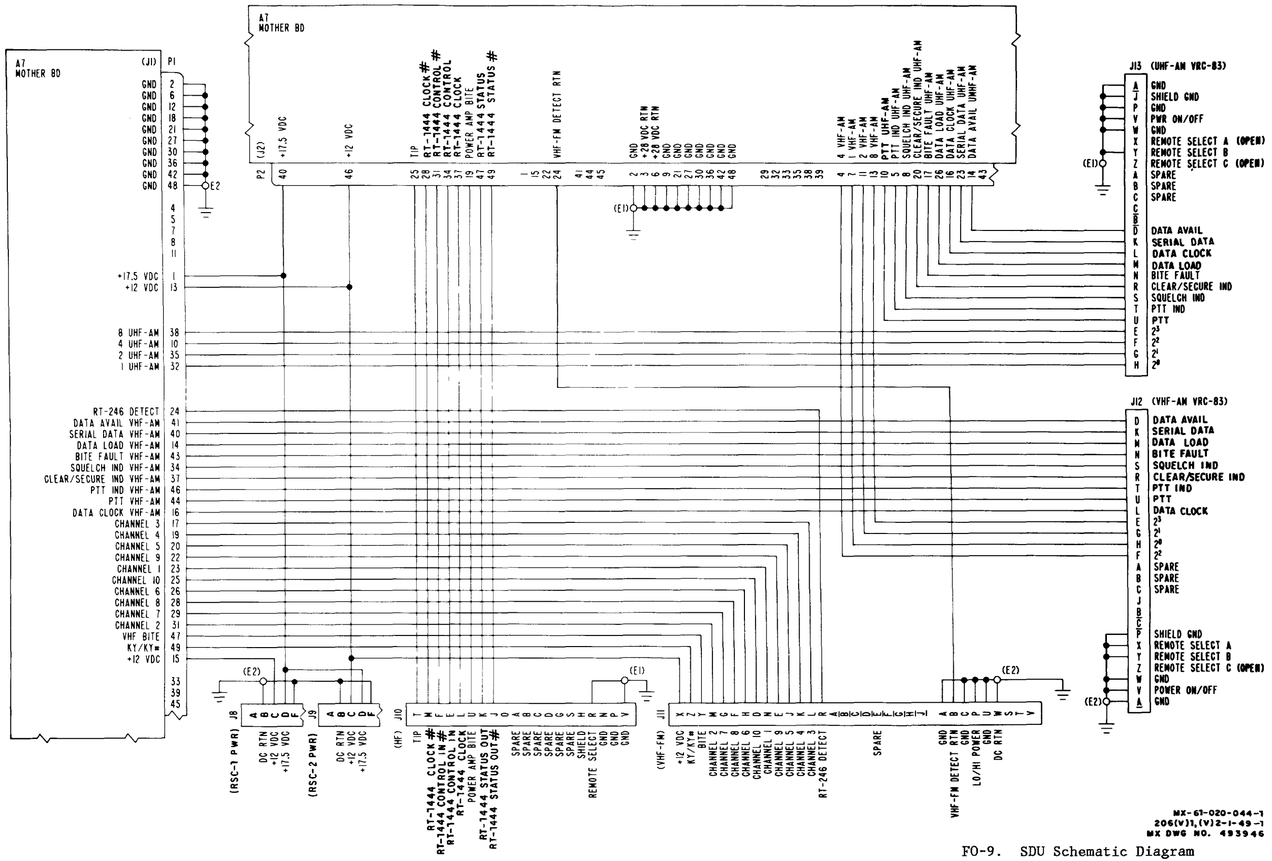
2.0 SPECIFIC:

2.1 UNLESS OTHERWISE SPECIFIED: VOLTAGES ARE DC.

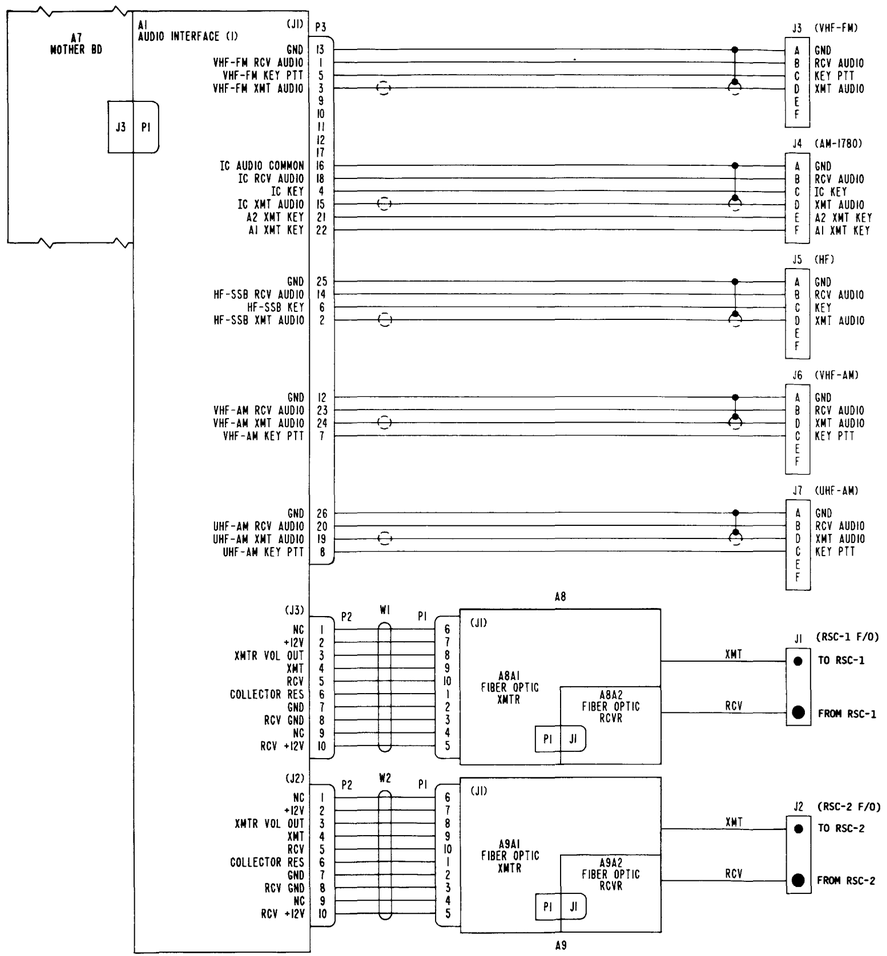
2.2 PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER AND SUBASSEMBLY DESIGNATION 1.

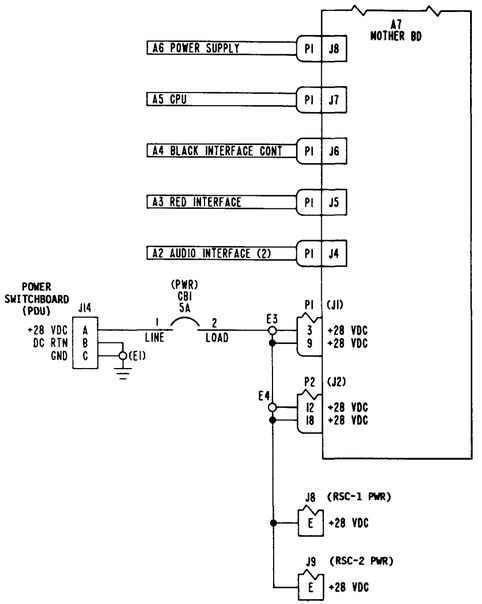
2.3 **FOR CONTINUATION OF CIRCUIT SEE WIRING DIAGRAM FIGURE FO-8.**

2.4 REFERENCE: ASSEMBLY NUMBER 812081-801 CASE ASSY 812086-801.



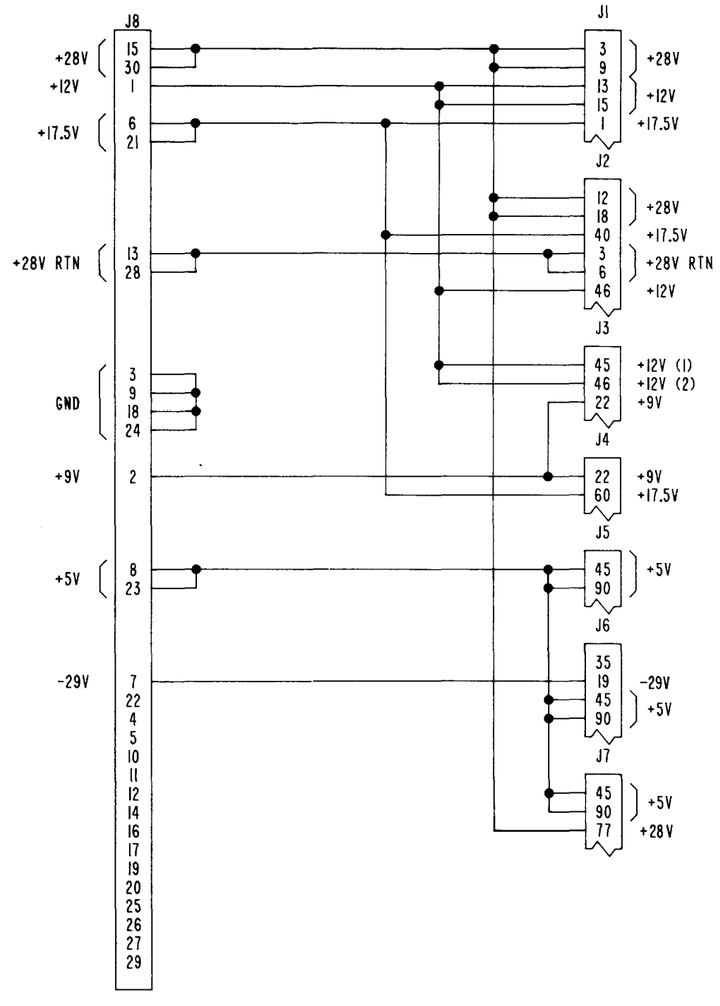
FO-9. SDU Schematic Diagram (Sheet 1 of 2)





MX-61-020-044-2
206(V)1,(V)2-1-49-2
MX DWG NO. 493946

FO-9. SDU Schematic Diagram
(Sheet 2 of 2)



NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 DATA INCLUDED IN PARENTHESIS, ( ), IS FOR REFERENCE ONLY.

1.3 A NUMBER SIGN (#) FOLLOWING A SIGNAL NAME MEANS THE INVERTED (NOT) FORM OF THE SIGNAL.

2.0 SPECIFIC:

2.1 UNLESS OTHERWISE SPECIFIED:

VOLTAGES ARE DC.

2.2 PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER AND SUBASSEMBLY DESIGNATION 1A7.

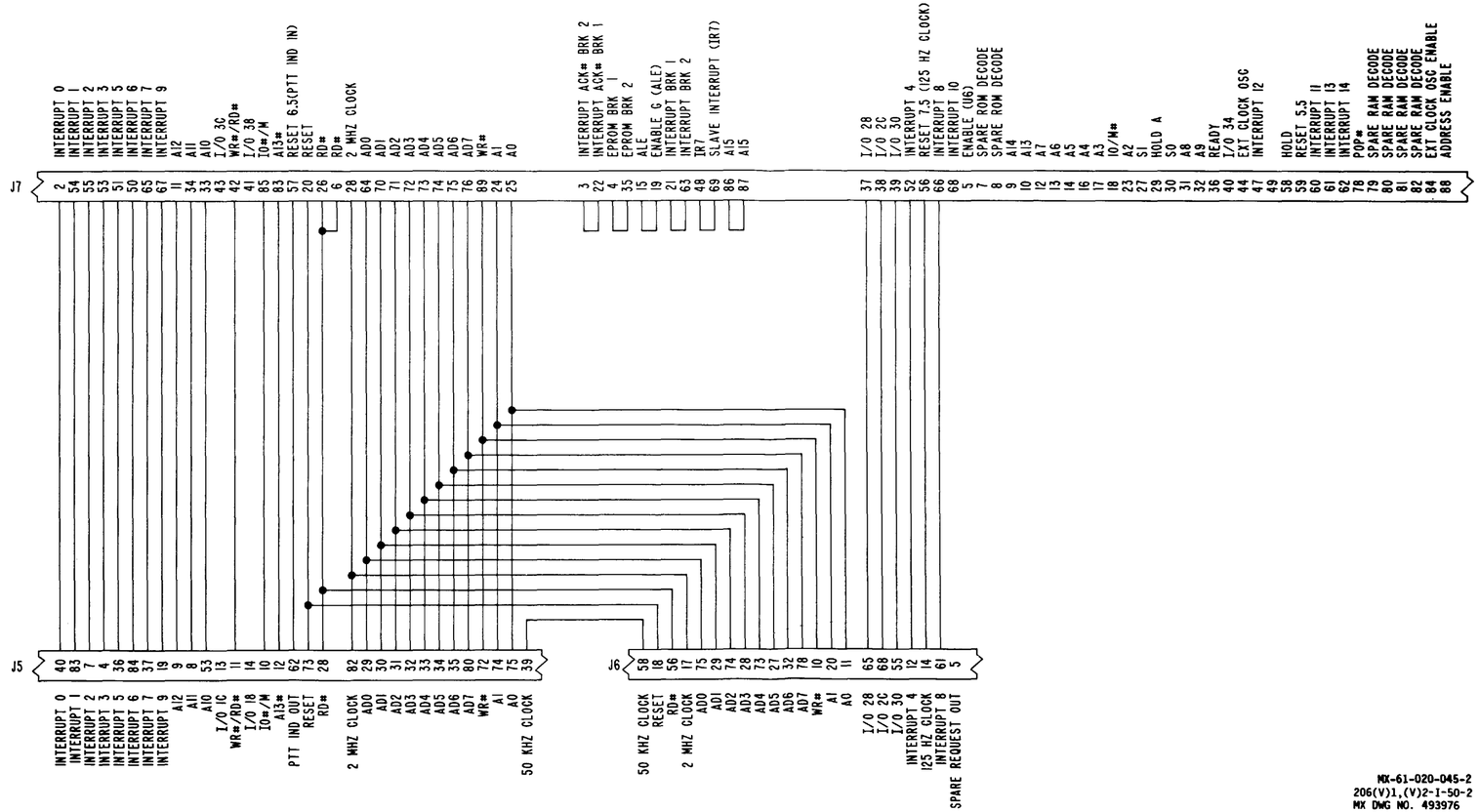
2.3 FOR CONTINUATION OF CIRCUIT SEE SCHEMATIC FIGURE FO-9.

2.4 REFERENCE:
ASSEMBLY NUMBER 812129-801.
PRINTED WIRING BOARD 412051-1.

REFERENCE DESIGNATION	
HIGHEST USED	NOT USED
J8	

MX-61-020-045-1
206(V)1,(V)2-I-50-1
MX DWG NO. 493976

FO-10. SDU Motherboard Schematic Diagram (Sheet 1 of 5)

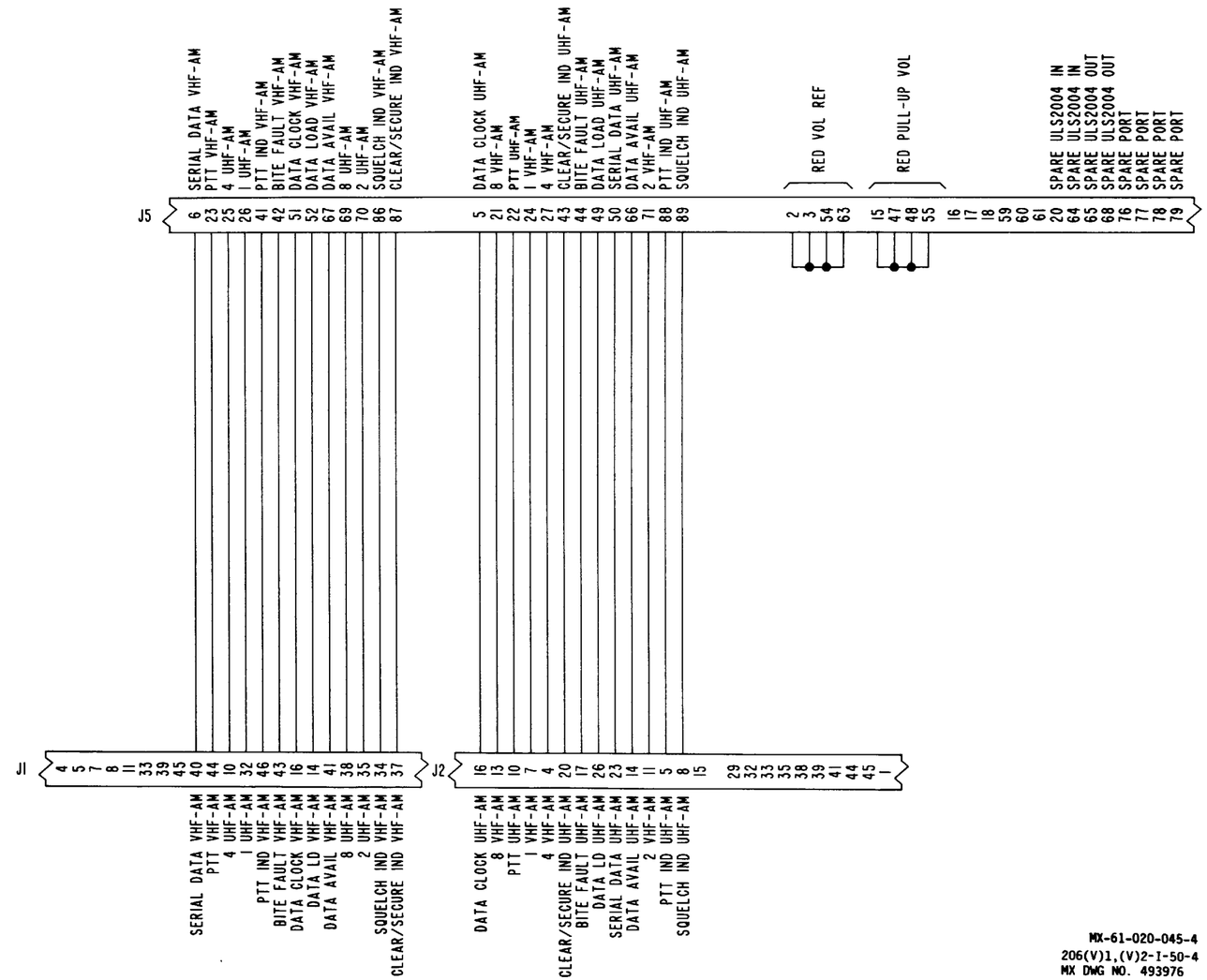


MX-61-020-045-2
206(V)1,(V)2-1-50-2
MX DWG NO. 493976

FO-10. SDU Motherboard Schematic Diagram (Sheet 2 of 5)

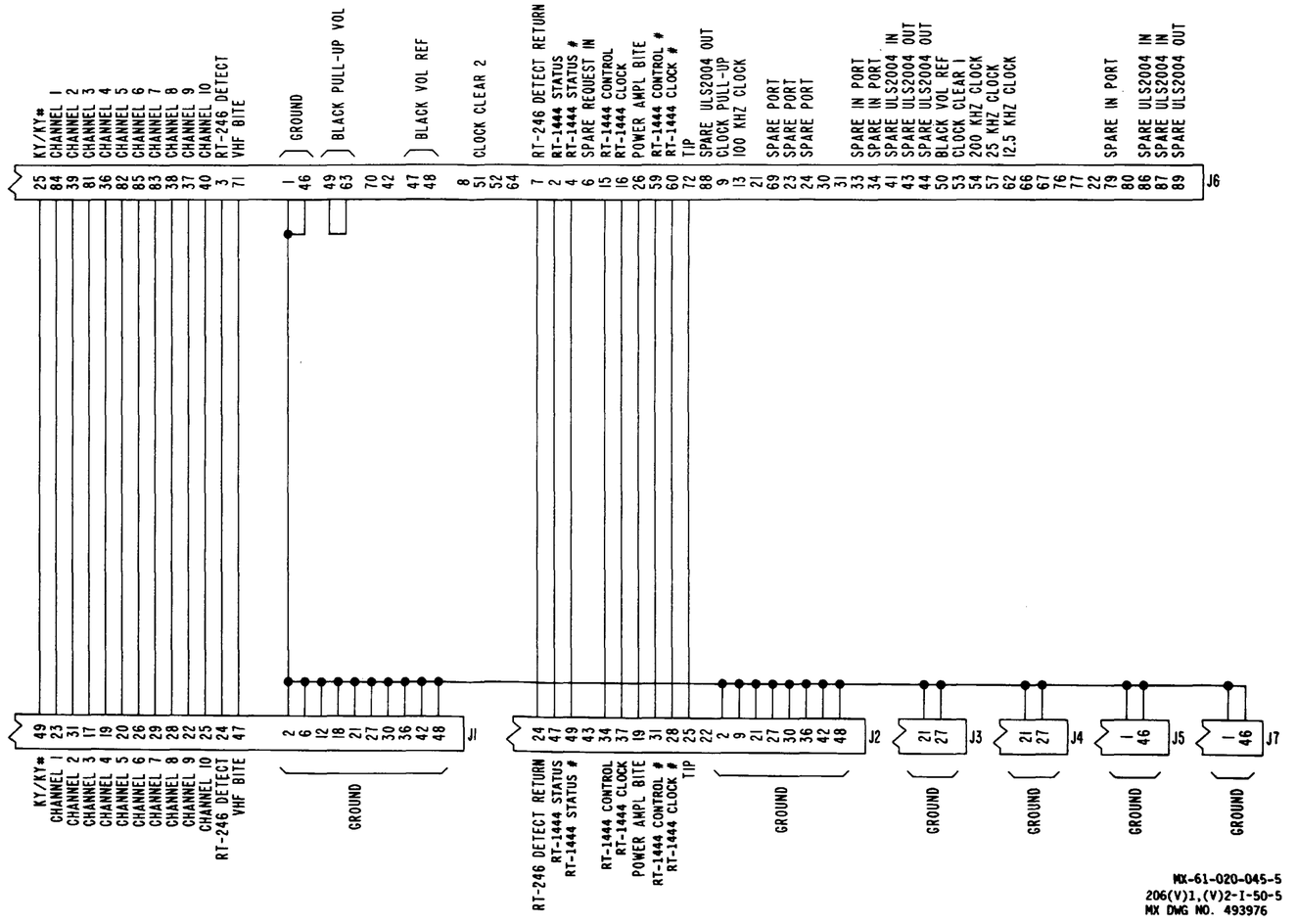
MX-61-020-045-3
206(V)1,(V)2-I-50-3
MX DWG NO. 493976

FO-10. SDU Motherboard Schematic Diagram (Sheet 3 of 5)



MX-61-020-045-4
206(V)1,(V)2-I-50-4
MX DWG NO. 493976

FO-10. SDU Motherboard Schematic Diagram (Sheet 4 of 5)



FO-10. SDU Motherboard Schematic Diagram (Sheet 5 of 5)

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 DATA INCLUDED IN PARENTHESIS, ( ), IS FOR REFERENCE ONLY.

1.3 A NUMBER SIGN (#) FOLLOWING A SIGNAL NAME MEANS THE INVERTED (NOT) FORM OF THE SIGNAL.

2.0 SPECIFIC:

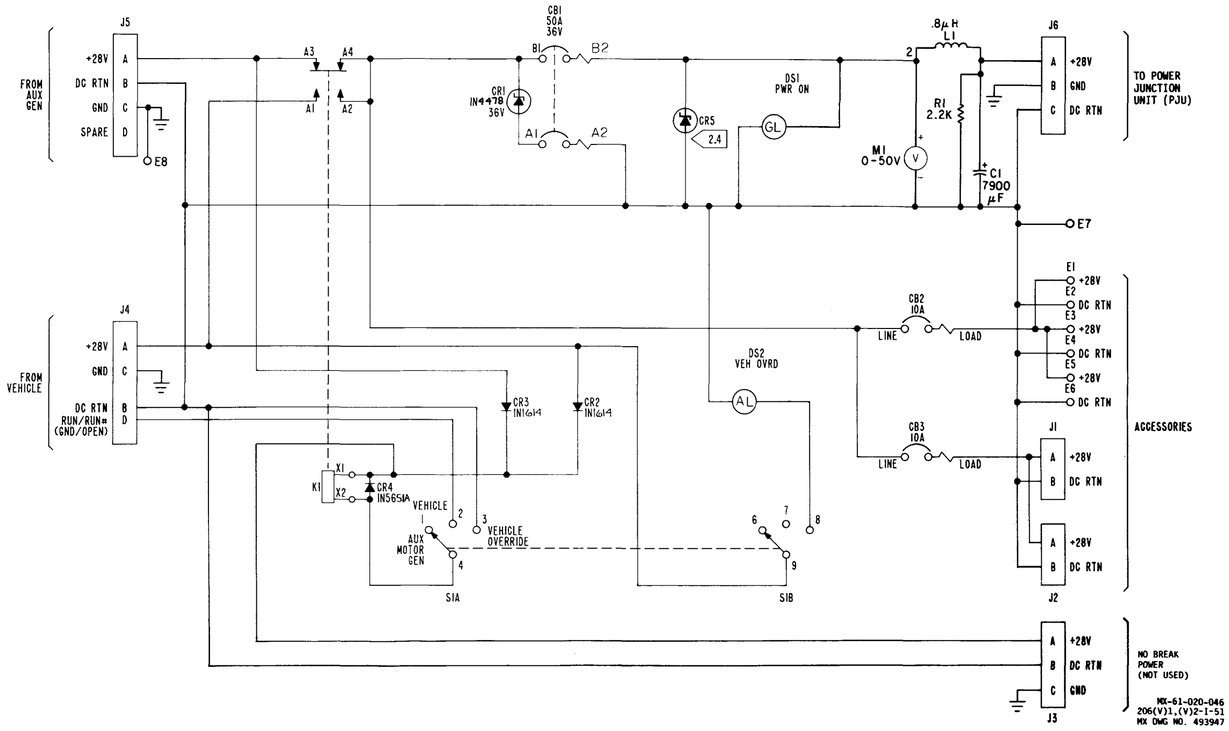
2.1 UNLESS OTHERWISE SPECIFIED:
VOLTAGES ARE DC.
DIODES AND/OR TRANSISTORS ARE JANTX TYPE.

2.2 PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER AND SUBASSEMBLY DESIGNATION 2.

2.3 FOR CONTINUATION OF CIRCUIT SEE WIRING DIAGRAM FIGURE FO-7 AND FO-8.

2.4 PART NUMBER 616497-903

2.5 REFERENCE:
ASSEMBLY NUMBER 812088-801.



FO-11. Power Switchboard Schematic Diagram

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 DATA INCLUDED IN PARENTHESIS, ( ), IS FOR REFERENCE ONLY.

1.3 A NUMBER SIGN (#) FOLLOWING A SIGNAL NAME MEANS THE INVERTED (NOT) FORM OF THE SIGNAL.

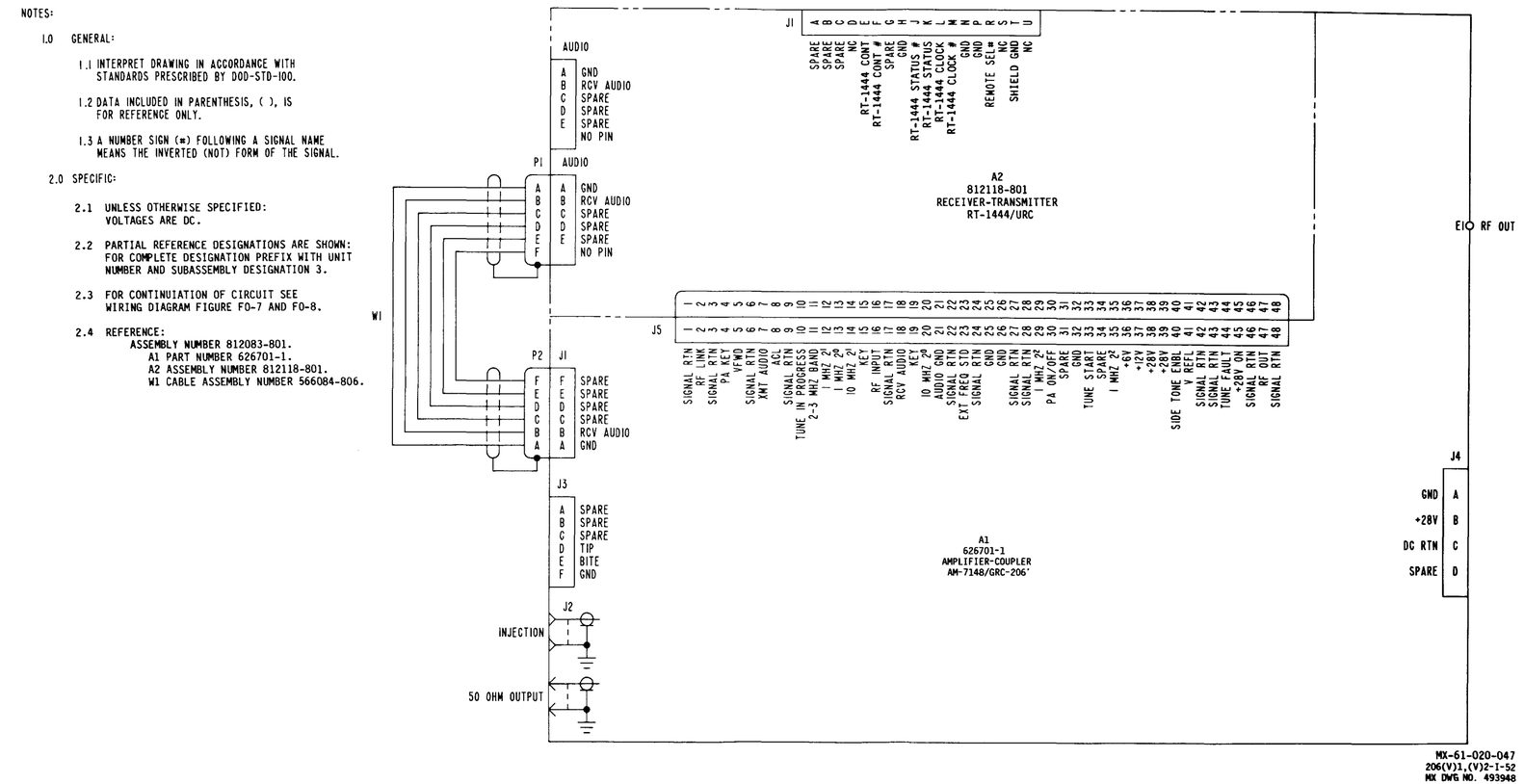
2.0 SPECIFIC:

2.1 UNLESS OTHERWISE SPECIFIED: VOLTAGES ARE DC.

2.2 PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER AND SUBASSEMBLY DESIGNATION 3.

2.3 FOR CONTINUIATION OF CIRCUIT SEE WIRING DIAGRAM FIGURE FO-7 AND FO-8.

2.4 REFERENCE:
ASSEMBLY NUMBER 812083-801.
A1 PART NUMBER 626701-1.
A2 ASSEMBLY NUMBER 812118-801.
W1 CABLE ASSEMBLY NUMBER 566084-806.



FO-12. HF-SSB Unit Schematic Diagram

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 DATA INCLUDED IN PARENTHESIS, ( ), IS FOR REFERENCE ONLY.

1.3 A NUMBER SIGN (#) FOLLOWING A SIGNAL NAME MEANS THE INVERTED (NOT) FORM OF THE SIGNAL.

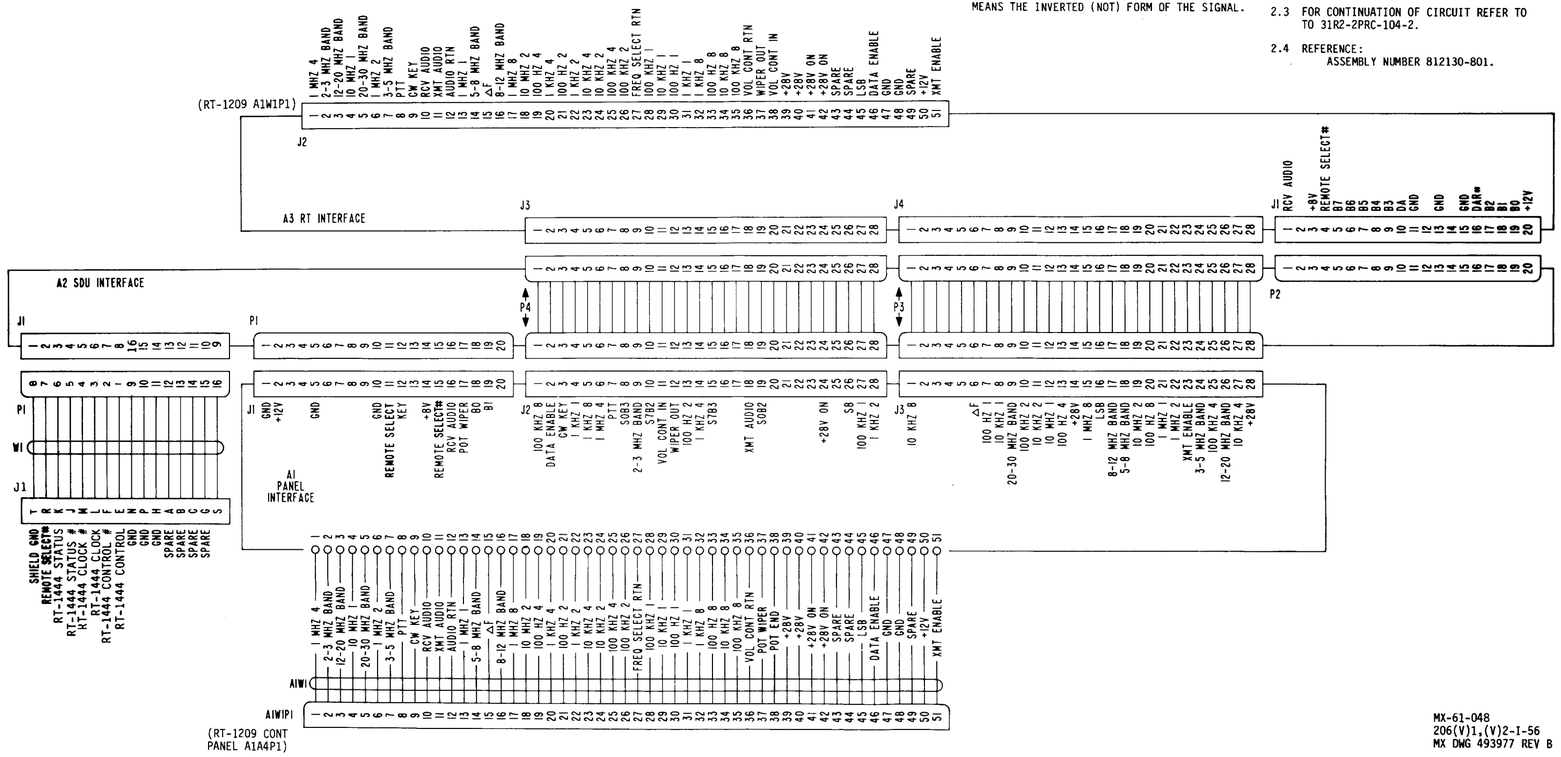
2.0 SPECIFIC:

2.1 UNLESS OTHERWISE SPECIFIED: VOLTAGES ARE DC.

2.2 PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER AND SUBASSEMBLY DESIGNATION 3A2A1.

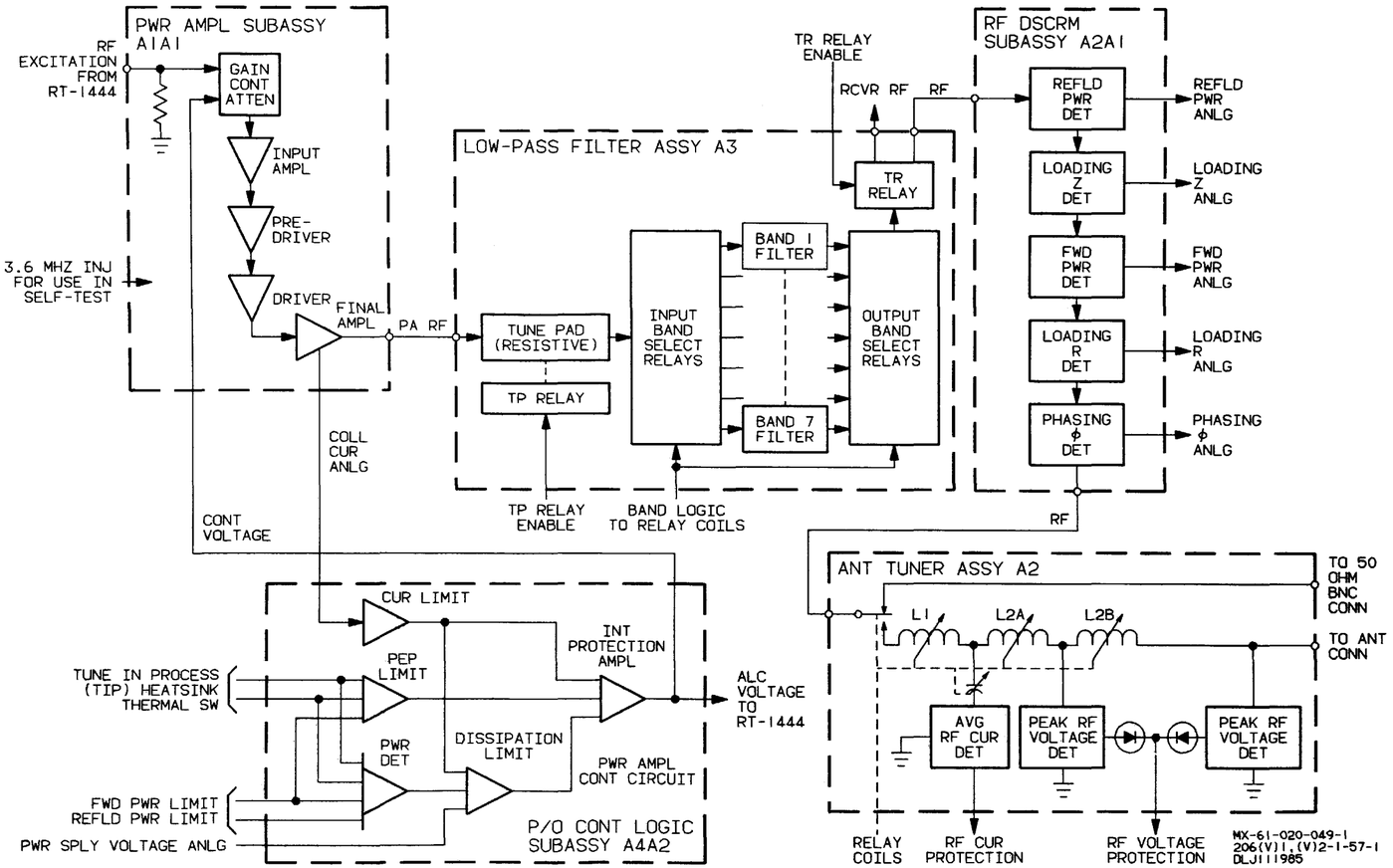
2.3 FOR CONTINUATION OF CIRCUIT REFER TO TO 31R2-2PRC-104-2.

2.4 REFERENCE: ASSEMBLY NUMBER 812130-801.

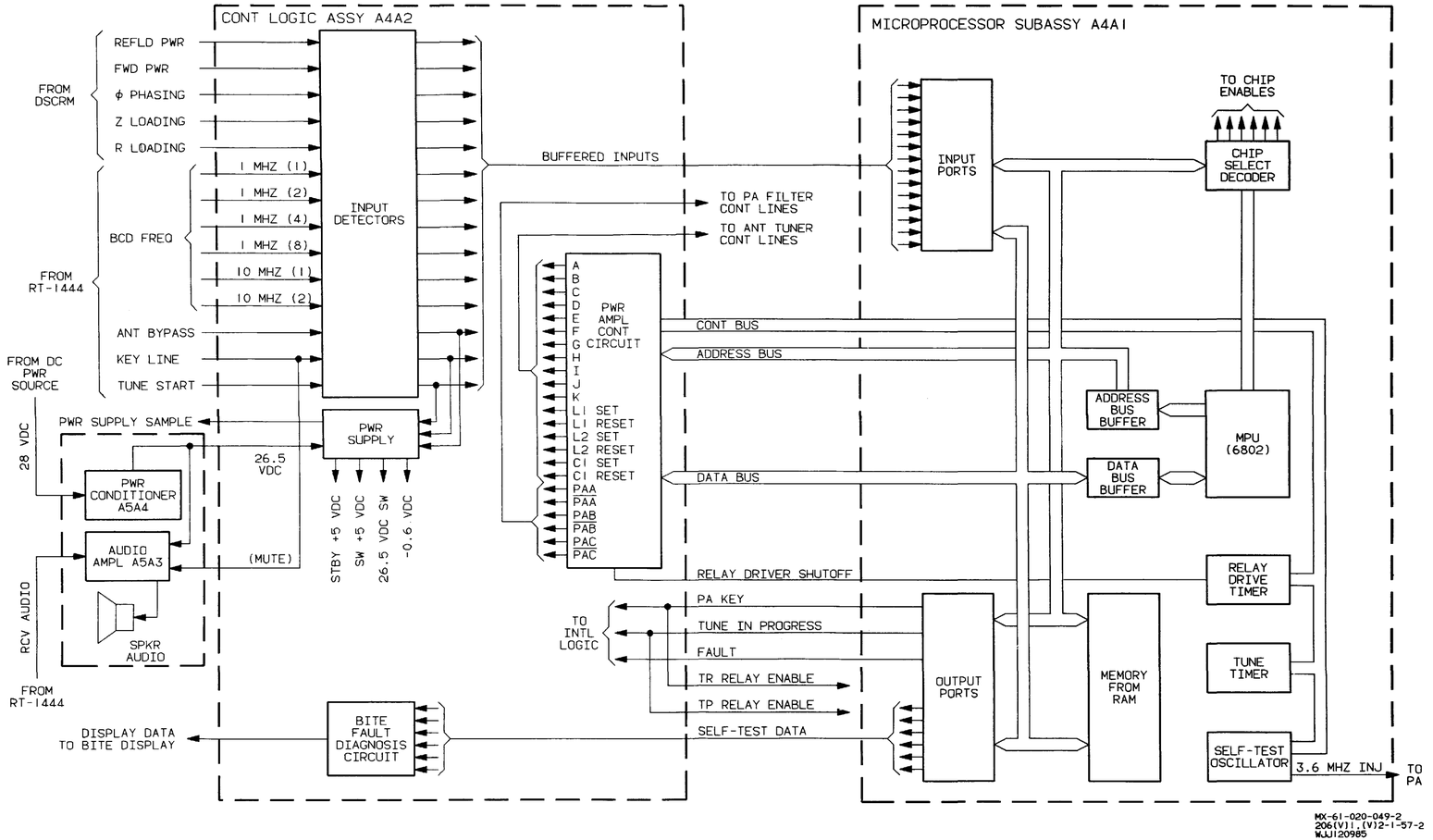


MX-61-048
206(V)1,(V)2-I-56
MX DWG 493977 REV B

FO-13. Remote Control Module Interconnect Diagram



FO-14. Amplifier-Coupler Simplified Block Diagram (Sheet 1 of 2)

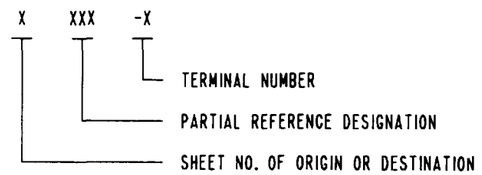


MX-61-020-049-2
206(V)1,(V)2-1-57-2
WJJ120985

FO-14. Amplifier-Coupler Simplified Block Diagram (Sheet 2 of 2)

REF DESIGNATION	
HIGHEST USED	NOT USED
A2 BT2	
A1	
A4 E9 J6 LS1 P2 W1	E3 J3,4,5
A2	
A3 J4 P4 R9 S4	

REFERENCE TABLE	
REF DES	PART NUMBER
A1A1	812866-801
A1A2	812933-801
A1A3	813286-801
A1A4	812099-801
A1W1	566613-801
A2A1	812126-801
A2A2	812133-801
A2A3	626483-4



TYPICAL CIRCUIT CONTINUATION CODE

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 DATA INCLUDED IN PARENTHESIS, ( ), IS FOR REFERENCE ONLY.

1.3 A NUMBER SIGN (#) FOLLOWING A SIGNAL NAME MEANS THE INVERTED (NOT) FORM OF THE SIGNAL.

2.0 SPECIFIC:

2.1 UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS.
RESISTORS ARE 1%, 1OW.
CAPACITANCE VALUES ARE IN MICROFARADS.
VOLTAGES ARE DC.
DIODES AND/OR TRANSISTORS ARE JANTX TYPE.

2.2 PARTIAL REFERENCE DESIGNATIONS ARE SHOWN: FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER AND SUBASSEMBLY DESIGNATION 5 & 6.

2.3 FOR CONTINUATION OF CIRCUIT SEE WIRING DIAGRAM FIGURE FO-7 AND FO-8.

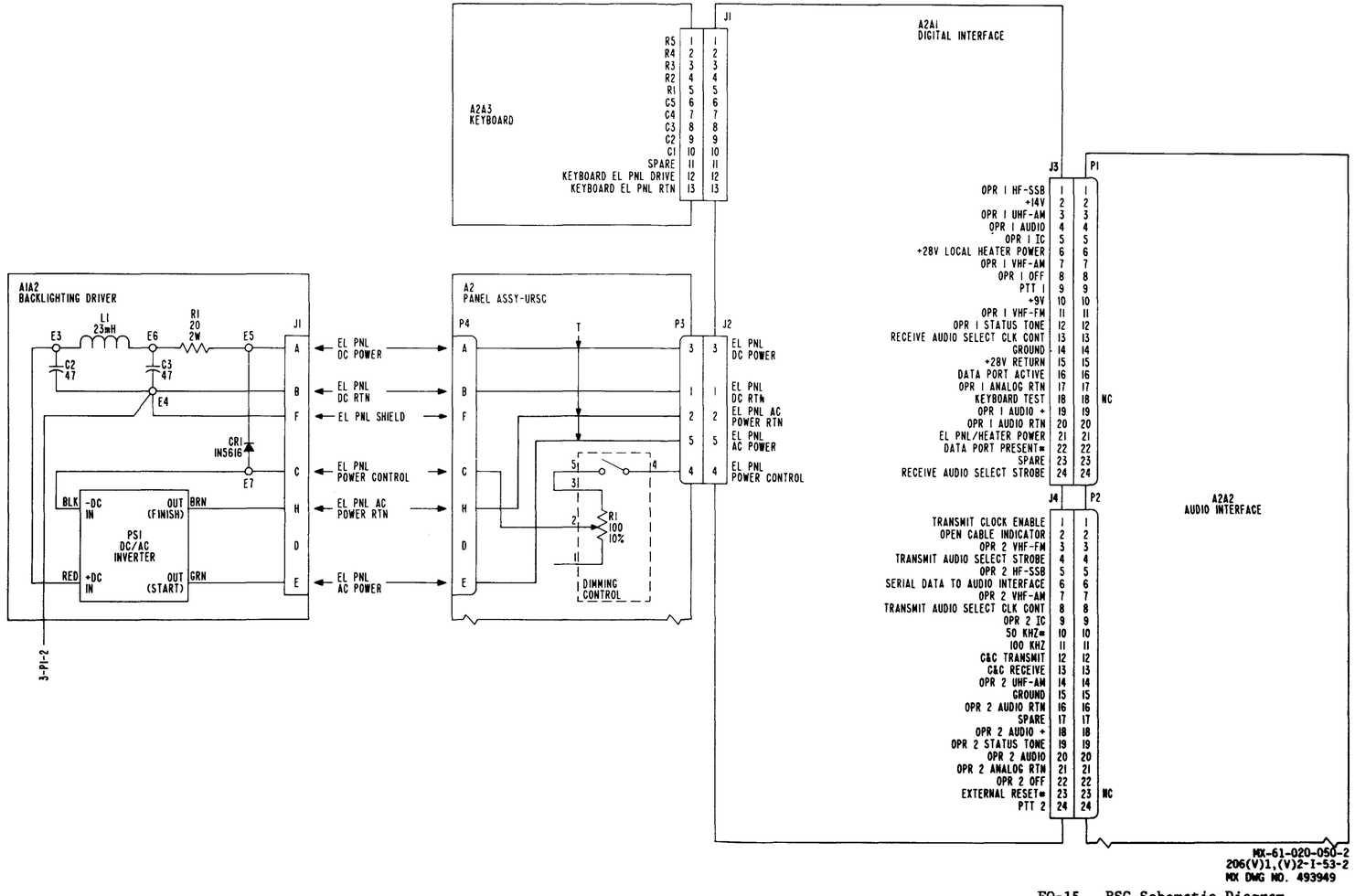
2.4 PART NUMBER 616494-901.

2.5 REFERENCE:
ASSEMBLY NUMBER 812085-801.
A1 ASSEMBLY NUMBER 812092-801.
A2 ASSEMBLY NUMBER 812120-801.

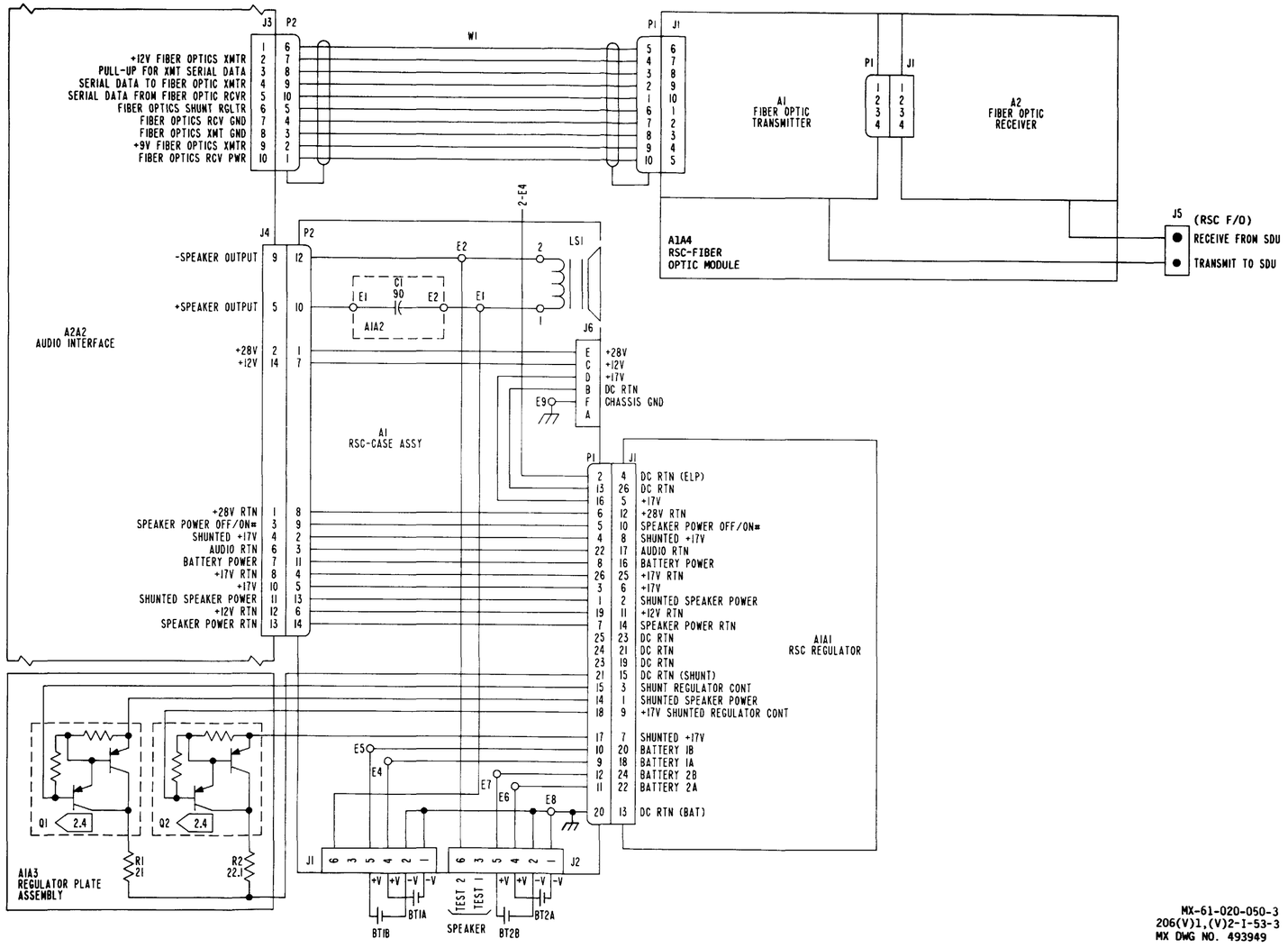
2.6 PART NUMBER 814341-801.

MX-61-020-050-1
206(V)1,(V)2-I-53-1
MX DWG NO. 493949

FO-15. RSC Schematic Diagram
(Sheet 1 of 4)

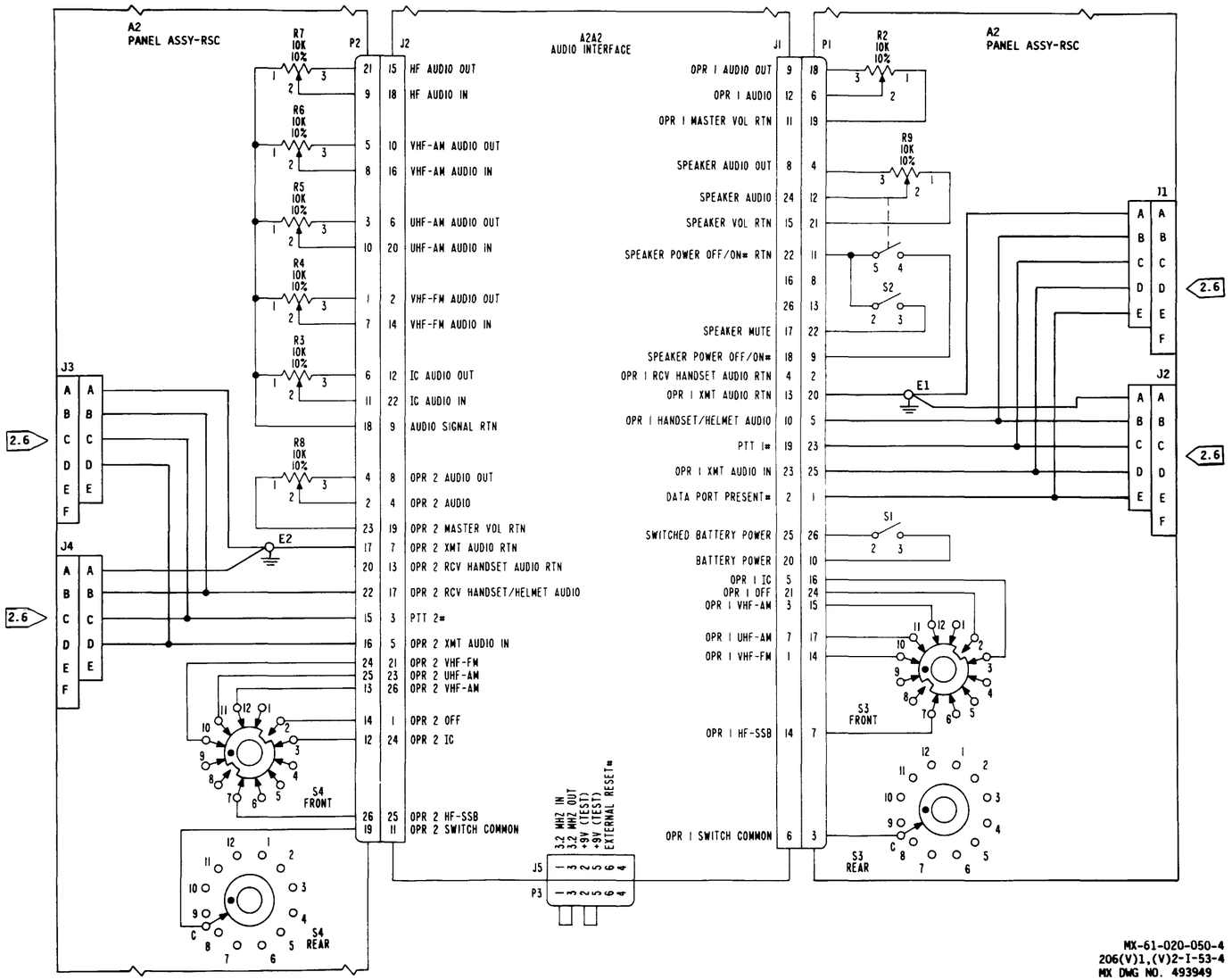


FO-15. RSC Schematic Diagram
(Sheet 2 of 4)



MX-61-020-050-3
206(V)1,(V)2-1-53-3
MX DWG NO. 493949

FO-15. RSC Schematic Diagram
(Sheet 3 of 4)



MX-61-020-050-4
206(V)1,(V)2-I-53-4
MX DWG NO. 493949

FO-15. RSC Schematic Diagram
(Sheet 4 of 4)

NOTES:

1.0 GENERAL:

1.1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY DOD-STD-100.

1.2 UNLESS OTHERWISE SPECIFIED, DIMENSIONS, TOLERANCES, AND SURFACE FINISH APPLY AFTER PLATING OR CHEMICAL FILM TREATMENTS, AND PRIOR TO ORGANIC COATINGS.

1.3 DO NOT SCALE DRAWING.

2.0 THIS ITEM TO BE USED IN ELECTRICAL EQUIPMENT MOUNTING BASE MT-6250/GRC-206 AND MT-6250B/GRC-206 ONLY.

3.0 THIS ITEM TO BE USED IN ELECTRICAL EQUIPMENT MOUNTING BASE MT-6250B/GRC-206 ONLY.

4.0 THIS ITEM TO BE USED IN ELECTRICAL EQUIPMENT MOUNTING BASE MT-6250A/GRC-206 ONLY.

5.0 TRIM CABLE STRAP TO APPROPRIATE LENGTH AFTER INSTALLATION.

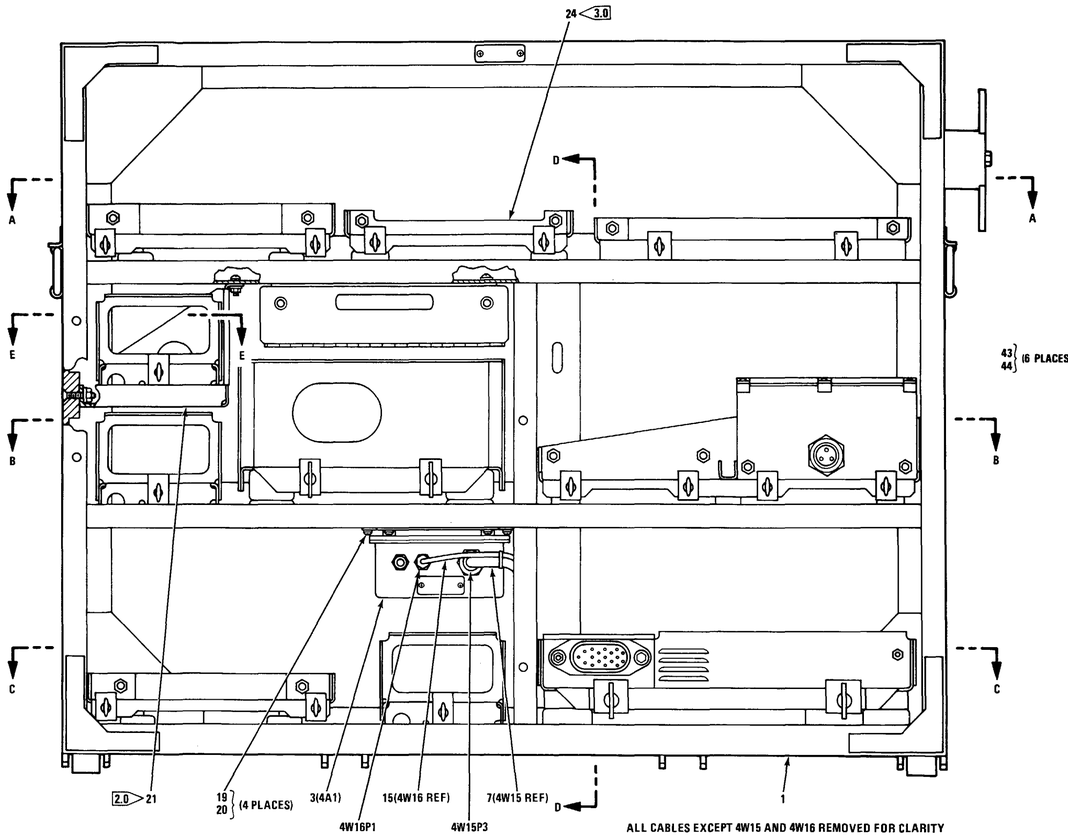
6.0 APPLY A THIN FILM OF GREASE PER MIL-G-4343 TO O-RING ON ITEM 33 PRIOR TO INSTALLATION.

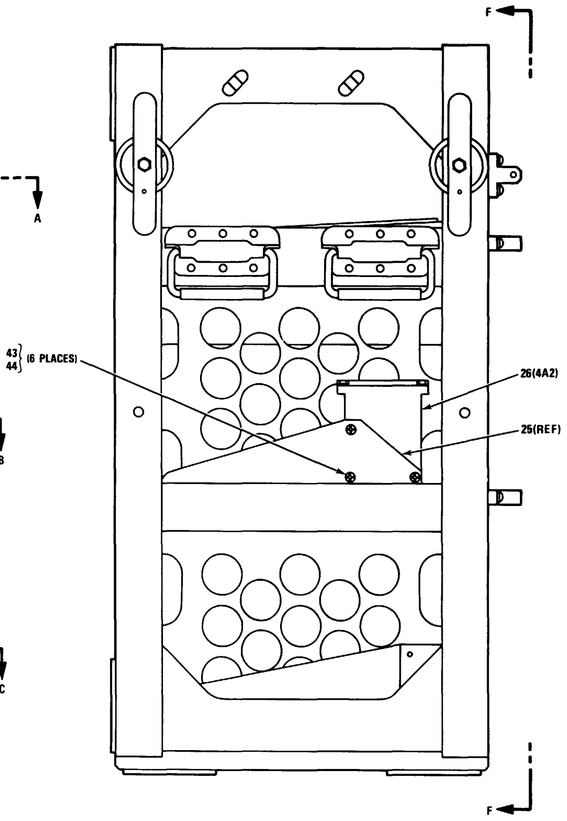
ITEM	DESCRIPTION			
	NAME	REF DES	QTY	PART NUMBER
1	Rack, Equipment Mounting	Unit 4	1	MX PN 514816-801
2	Cable Assembly	4W9	1	MX PN 566083-801
3	FM BITE/Audio Interface Assembly	4A1	1	MX PN 812132-801
4	Mount, VRC-83		2	MX PN 812097-801
5	Cable Asembly	4W13	2	MX PN 566083-802
6	VHF-FM Mount, GFE			5820-00-893-1323
7	Cable Assembly	4W15	1	MX PN 566083-803
8	Cable Assembly	4W10	1	MX PN 566084-801
9	Cable Assembly	4W12	2	MX PN 566084-802
10	Mount, HF Power Amplifier/ Antenna Coupler		1	MX PN 626701-2
11	Mount, KY-57		3	MX PN 812137-801
12	Cable Assembly	4W17	1	MX PN 566084-803
13	KY-65 Mount, GFE			5810-01-050-7984
14	Cable Assembly	4W11	1	MX PN 566084-804
15	Cable Assembly, Antenna	4W16	1	MX PN 566078-802
16	Cable Assembly	4W14	2	MX PN 566084-805
17	Cable Assembly	4W18	1	MX PN 566083-804
18	Cable Assembly	4W19	1	MX PN 566083-805
19	Washer, Lock		4	MS35338-138
20	Srew, Machine		4	MS51958-65
21	Shelf, KY-57		1	MX PN 939189-801
22	Grommet, Edging		AR	MX PN 136603-1
23	Grommet, Edging		AR	MX PN 136603-2

ITEM	DESCRIPTION			
	NAME	REF DES	QTY	PART NUMBER
24	Mount, RFO		1	MX PN 812880-801
25	Mount, Power Switchboard		1	MX PN 812098-801
26	Power Junction Unit	4A2	1	MX PN 812119-801
27	Cable Assembly	4W1	1	MX PN 566085-801
28	Cable Assembly	4W2	2	MX PN 566085-802
29	Cable Assembly	4W3	2	MX PN 566085-803
30	Cable Assembly	4W4	1	MX PN 566085-804
31	Cable Assembly	4W5	3	MX PN 566085-805
32	Cable Assembly	4W6	1	MX PN 566085-806
33	Plug, Bushing		1	MX PN 514993-1
34	Cable Assembly	4W20	1	MX PN 566083-807
35	Cable Assembly	4W8	1	MX PN 566085-808
36	Bracket, Mounting		3	MX PN 938713-801
37	Circuit Breaker, Magnetic	4CB1,2,3	3	M39019/01-218
38	Strap, Tiedown		50	MS3367-1-0
39	Strap, Ground		2	MX PN 938770-2
40	Strap, Ground		1	MX PN 938770-3
41	Strap, Ground		1	MX PN 938770-4
42	Strap, Retaining		13	MX PN 136617-3
43	Screw, Machine		6	MS51957-43
44	Washer, Lock		6	MS35338-137
45	Screw, Machine		6	MS24693C26
46	Insulation, Sleeving		AR	M23053/5-207C
47	Strap, Ground		1	MX PN 938770-6

MX-01-020-001-1
REF MX DWG 812804 REV E

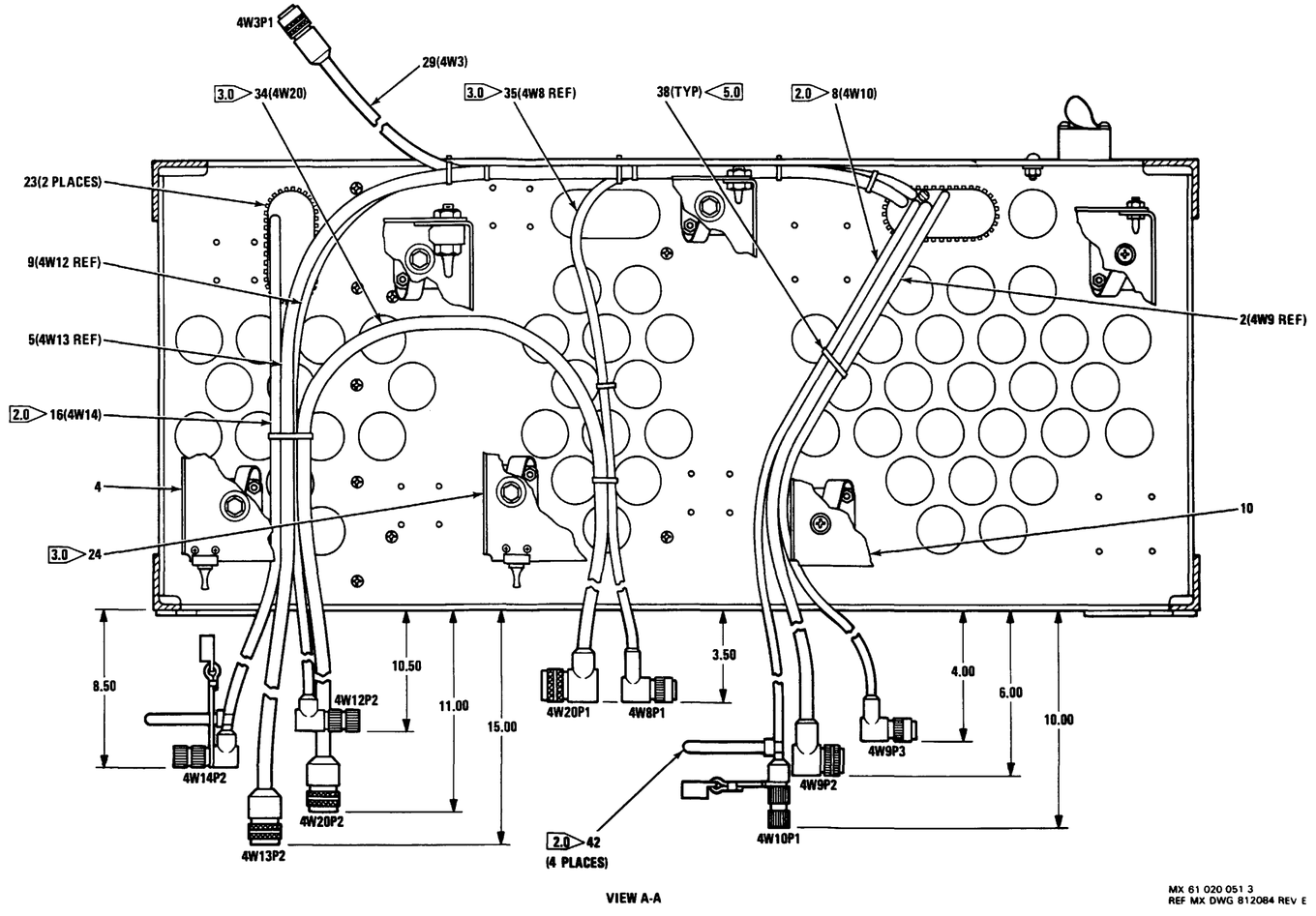
FO-16. Equipment Mounting Rack Assembly Diagram (Sheet 1 of 7)



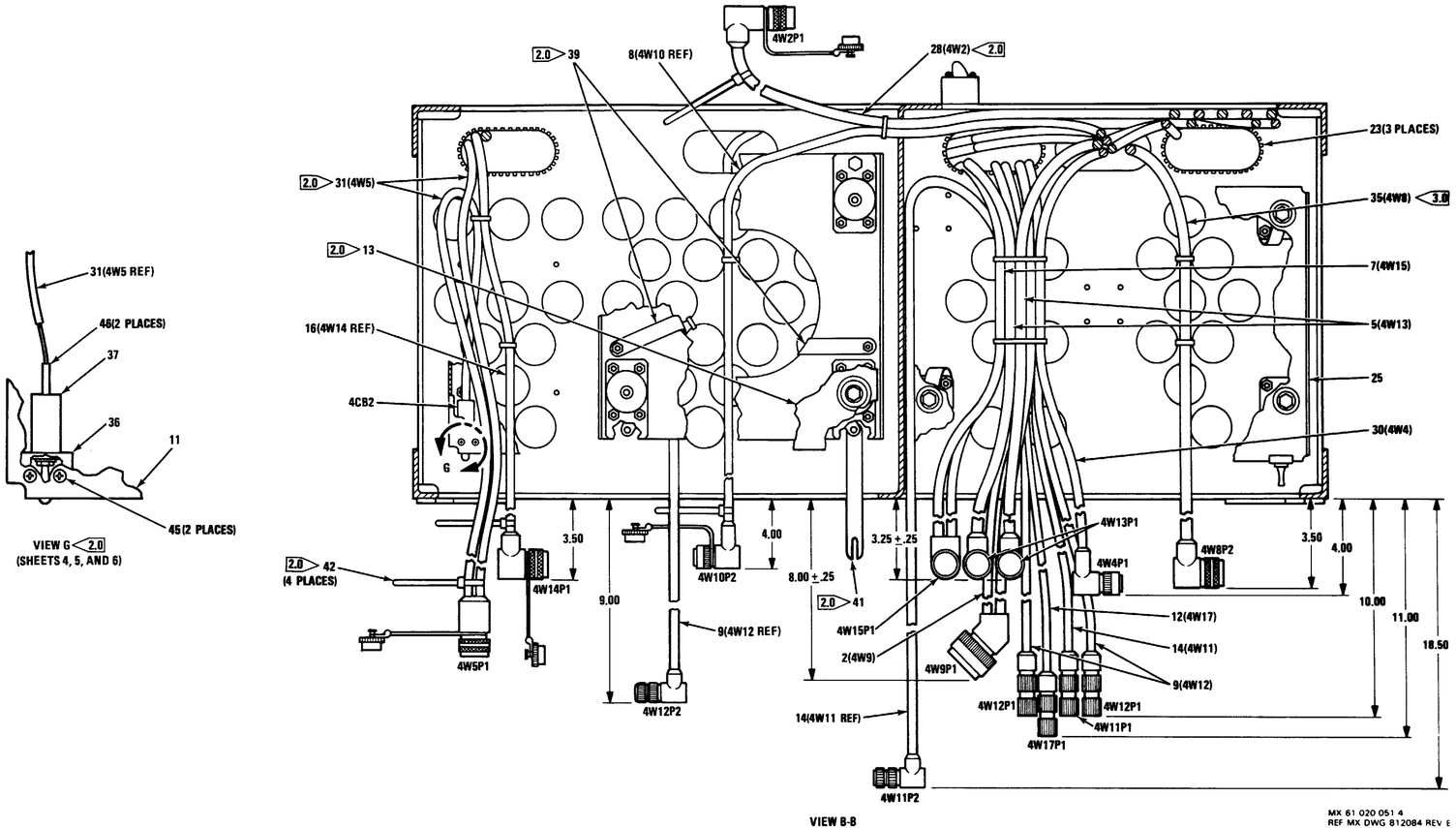


MX 61 020 051 2
REF MX DWG 812084 REV E

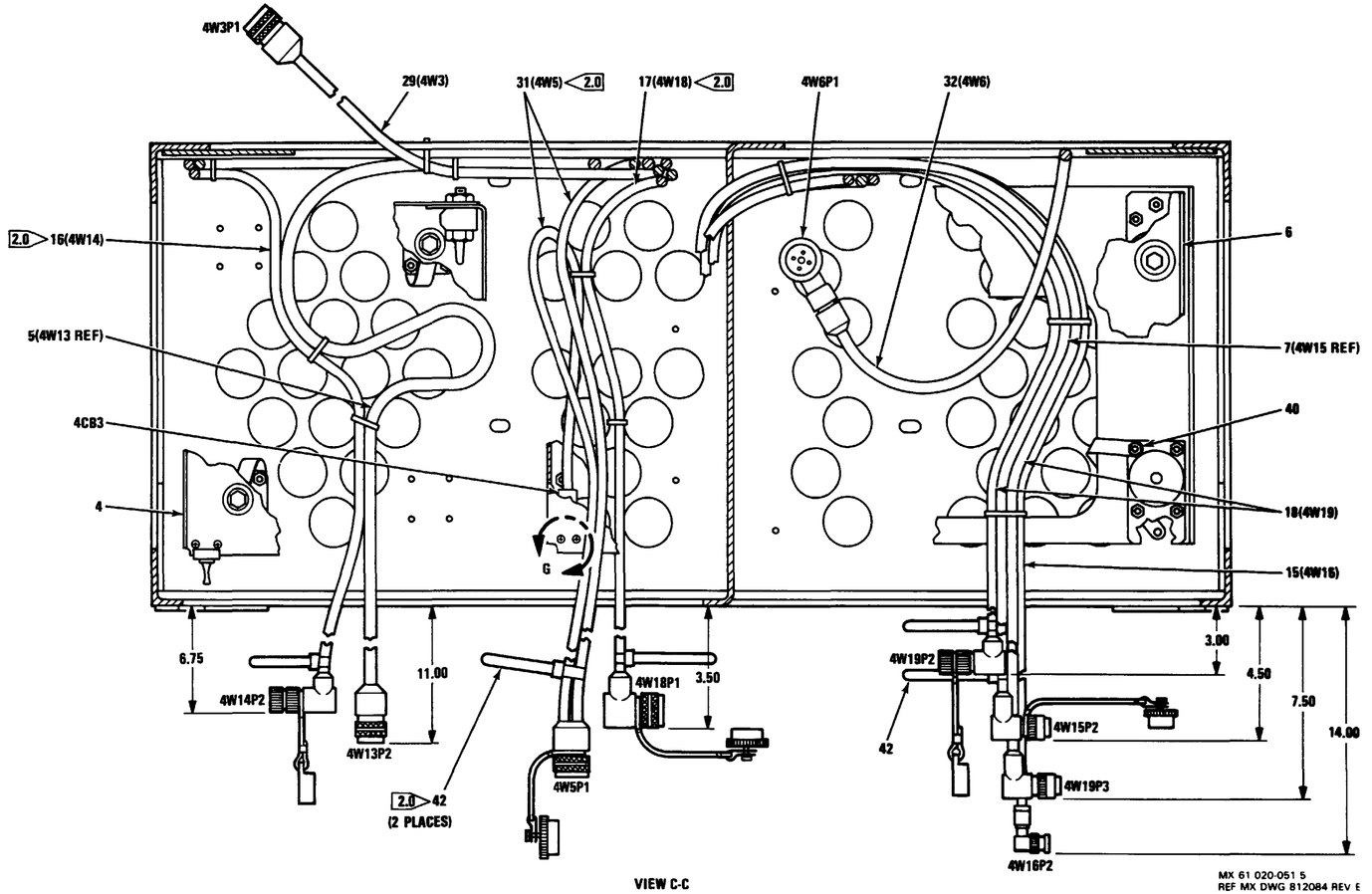
FO-16. Equipment Mounting Rack Assembly Diagram (Sheet 2 of 7)



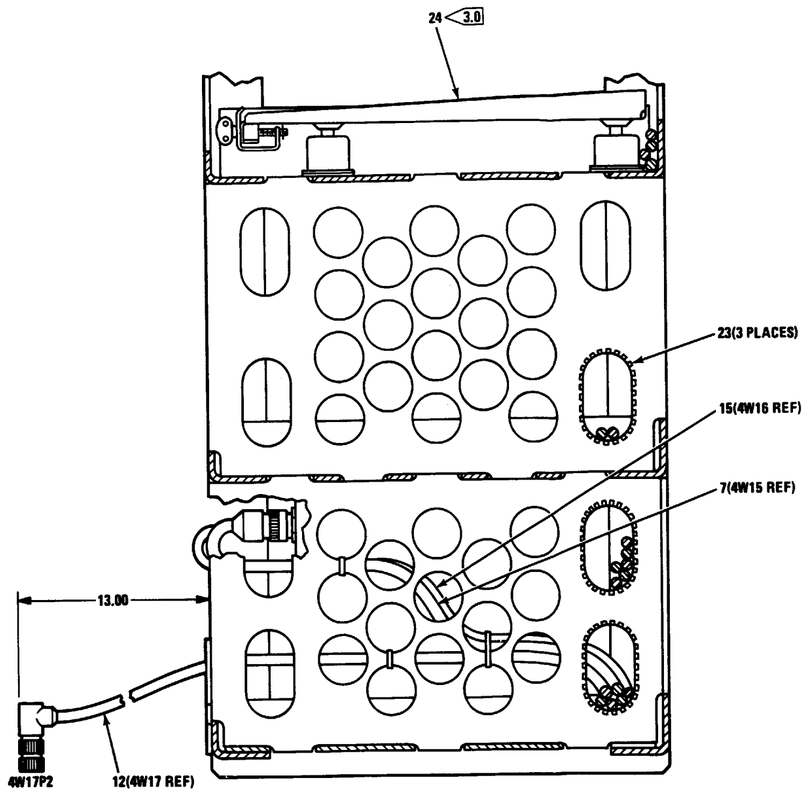
FO-16. Equipment Mounting Rack Assembly Diagram (Sheet 3 of 7)



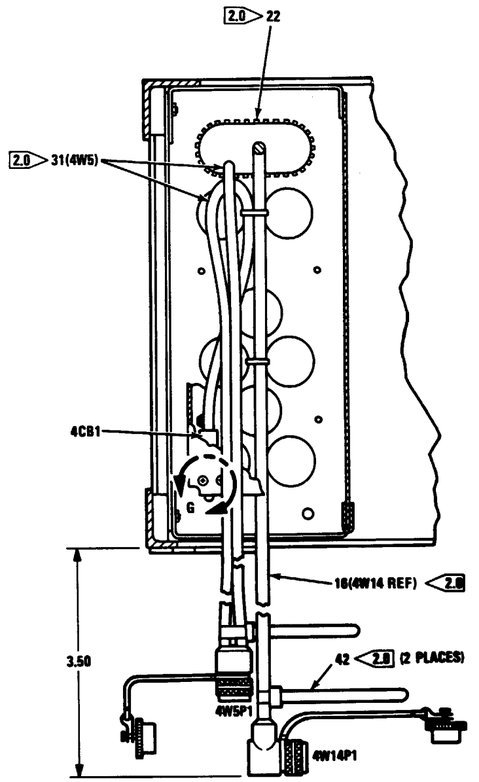
FO-16. Equipment Mounting Rack Assembly Diagram (Sheet 4 of 7)



FO-16. Equipment Mounting Rack Assembly Diagram (Sheet 5 of 7)



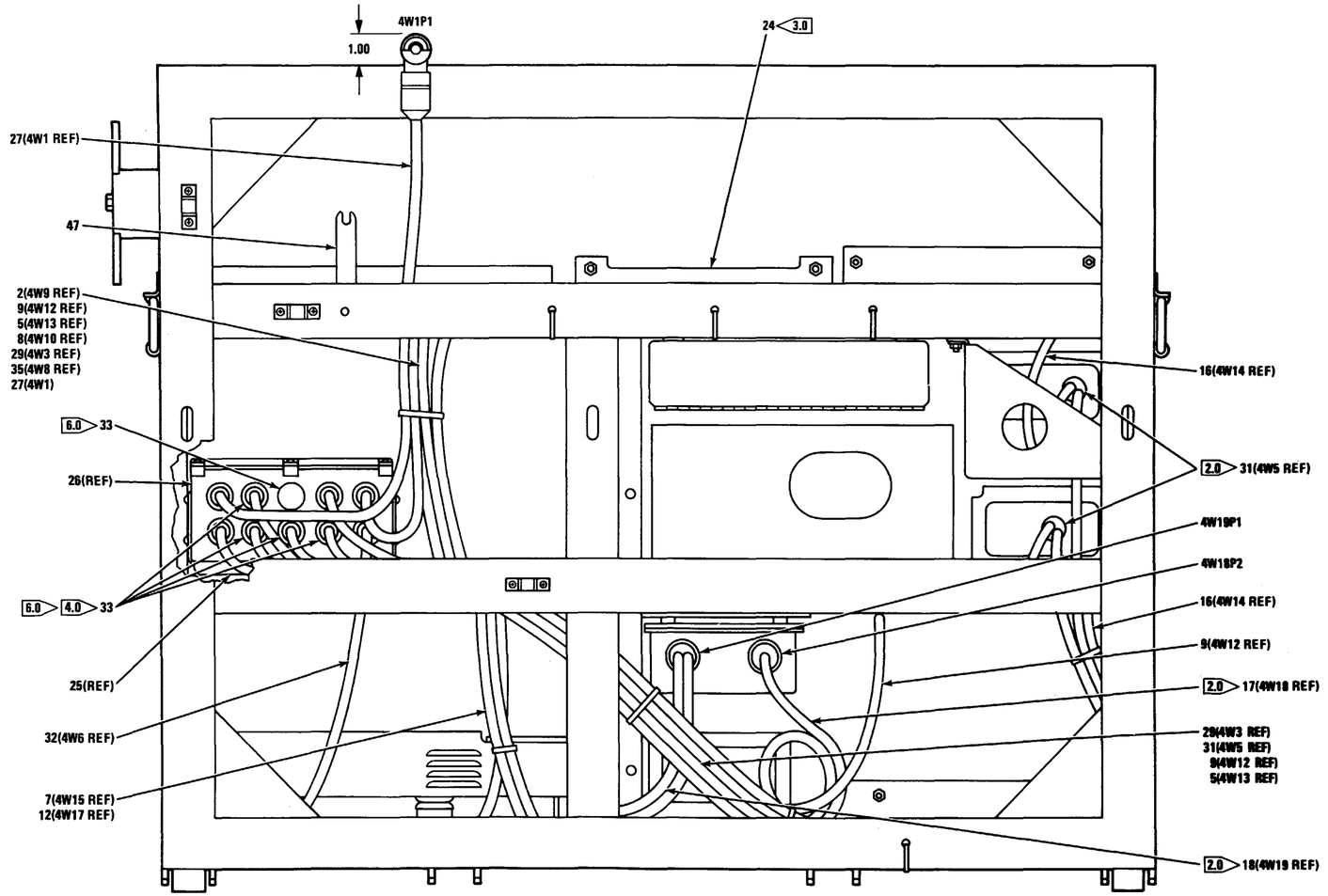
VIEW D-D



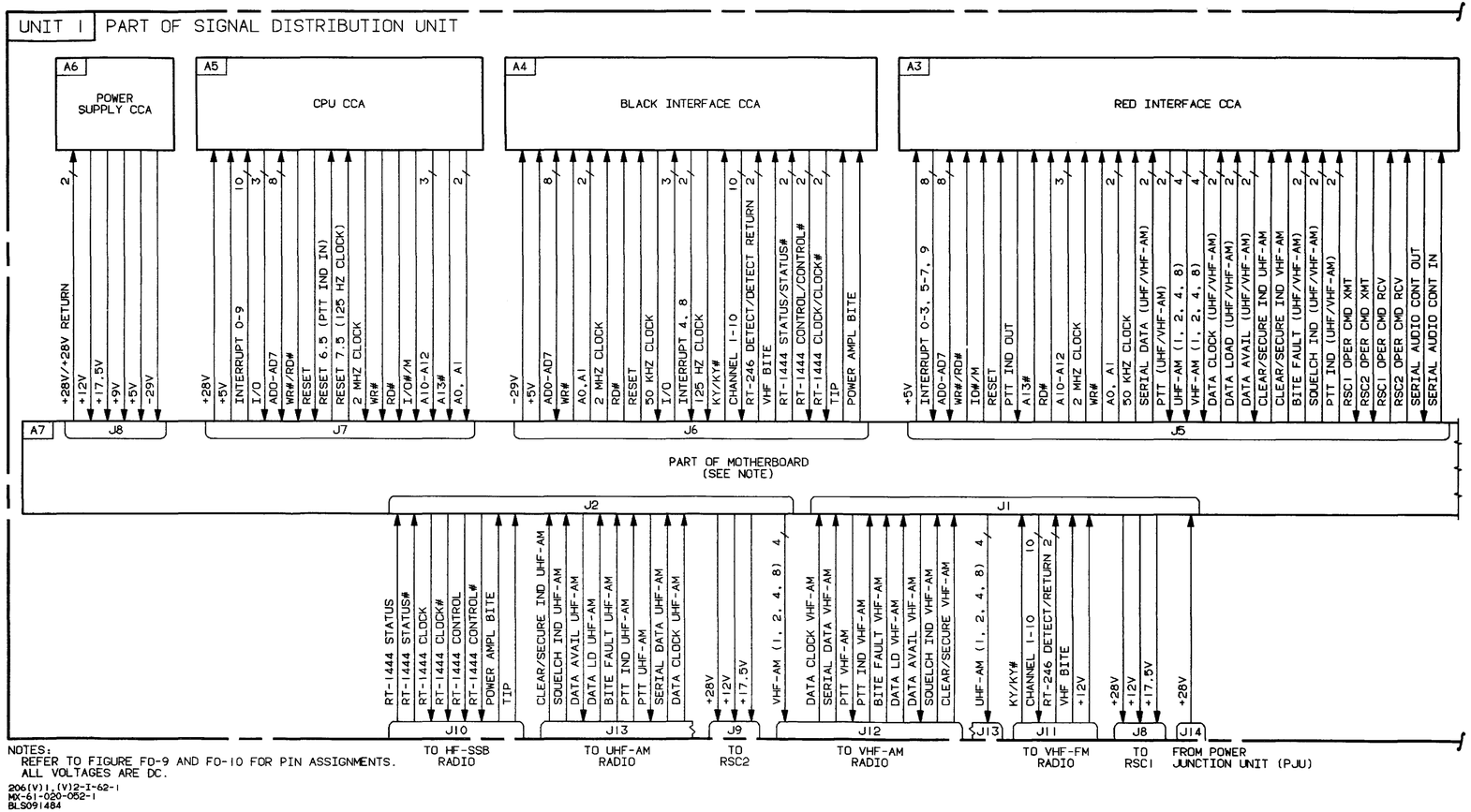
VIEW E-E

MX-61 020-051 6
REF MX DWG 821084 REV E

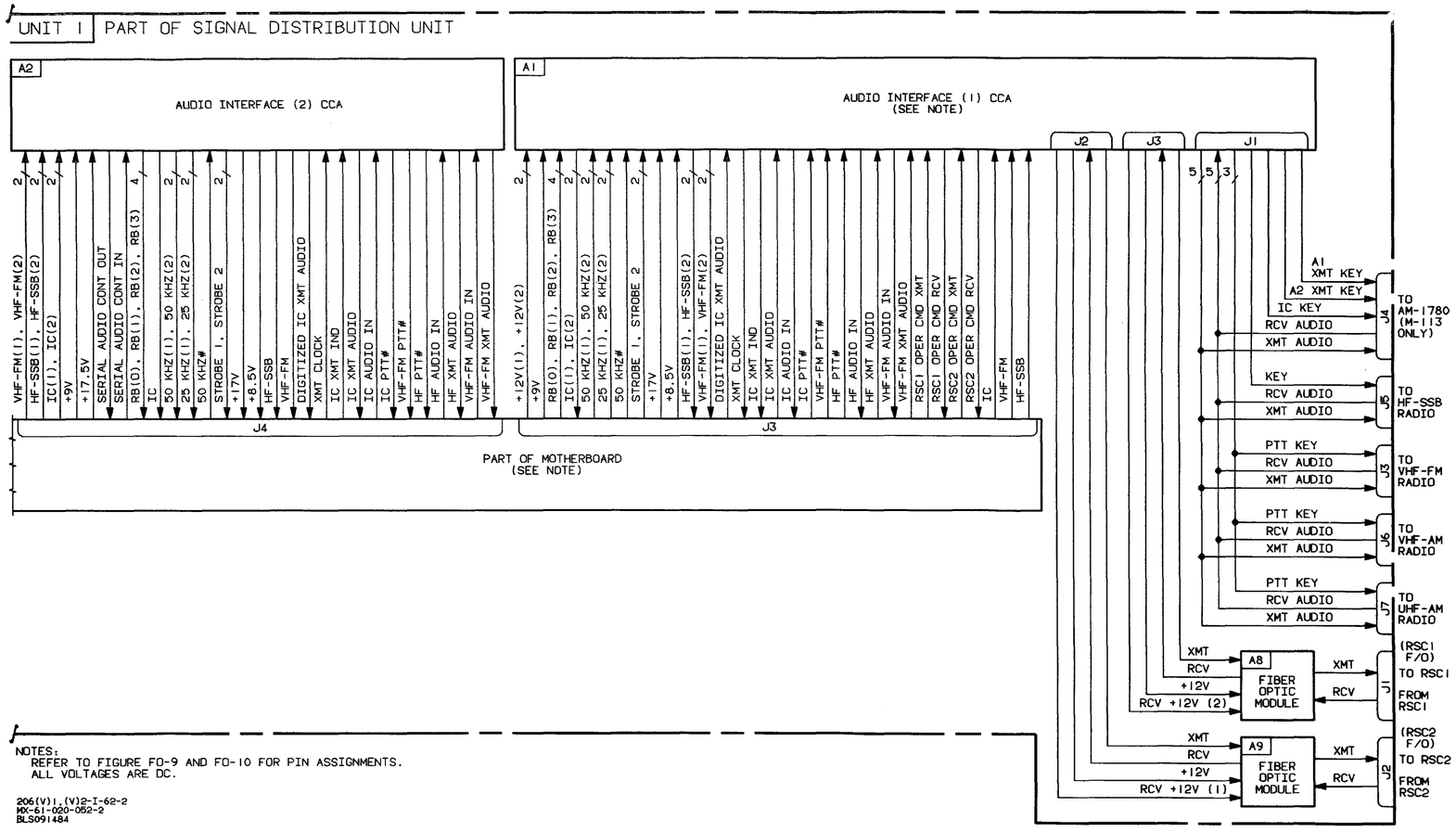
FO-16. Equipment Mounting Rack Assembly Diagram (Sheet 6 of 7)



FO-16. Equipment Mounting Rack Assembly Diagram (Sheet 7 of 7)



FO-17. Signal Distribution Unit
Simplified Block Diagram (Sheet 1 of 2)



NOTES:
REFER TO FIGURE FO-9 AND FO-10 FOR PIN ASSIGNMENTS.
ALL VOLTAGES ARE DC.

206(V)1,(V)2-I-62-2
MX-61-020-052-2
BLS091484

FO-17. Signal Distribution Unit Simplified Block Diagram (Sheet 2 of 2)